SEP 3 1913

JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the act of Congress March 3, 1879.

VOL. XXXI NO. 9 SAN FRANCISCO, AUGUST 30, 1913 PER COPY, 25 CENTS

THE STAVE FALLS POWER PLANT.
BY E. R. PEASE.

ELECTRICITY AND THE ARCHITECT.
BY C. S. WALTON.

ELECTRIC POWER FOR THE SAWMILL.

EFFICIENT MANAGEMENT.
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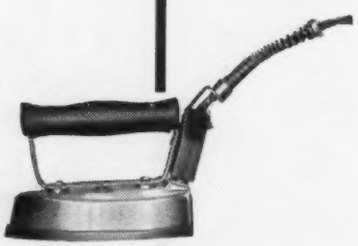

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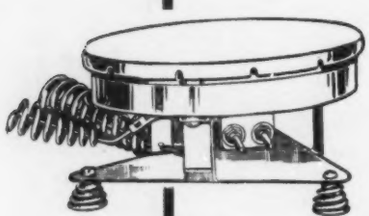

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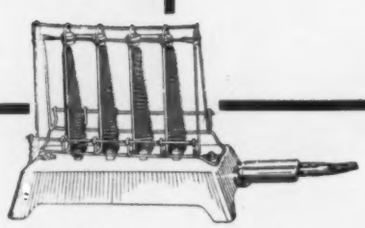

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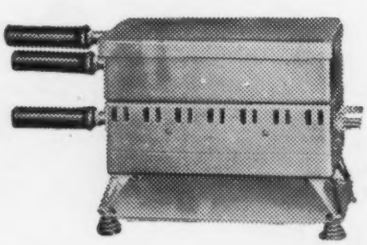

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VOLUME XXXI SAN FRANCISCO, AUGUST 30, 1913 NUMBER 9

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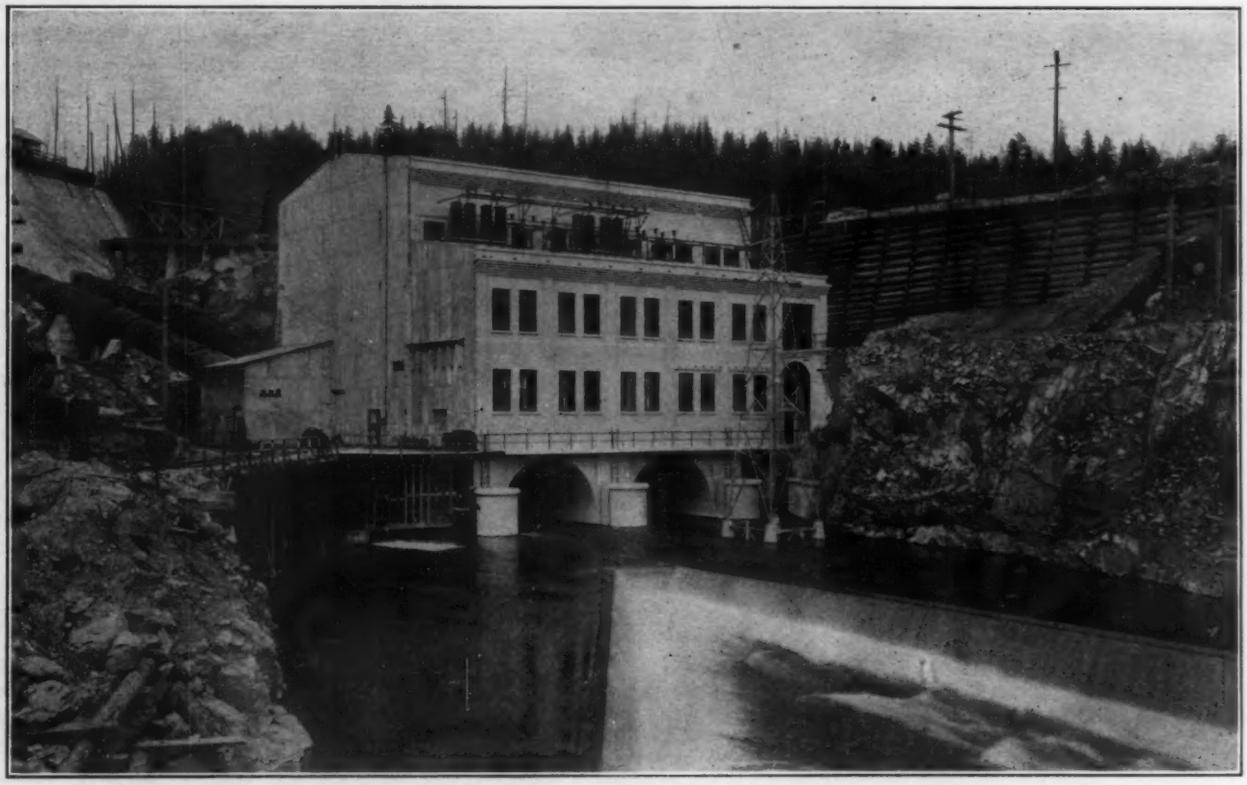
THE STAVE FALLS POWER PLANT

BY E. R. PEASE.

The Western Canada Power Company, Limited, was formed in 1909 for the express purpose of supplying power for industrial purposes in Vancouver and the vicinity at such rates as to encourage the establishment of factories and in sufficient quantity to meet any demand that the rapid growth of Vancouver may develop.

In June, 1909, the company took over the property and franchises of the Stave Lake Power Company, Limited, which had secured a charter from the government of the Province of British Columbia giving it the right to develop power on the Stave River, and to distribute power over the whole of the district surrounding Vancouver, and had also secured franchises for the sale of power for industrial purposes in Vancouver and New Westminster.

The Stave Lake Power Company had in the course of several years previous to 1909, done considerable preliminary work at the Stave River, including the establishment of a gauging station, the building of roads and camps, and the partial construction of a log sluice dam.



Stave Falls Power Plant of Western Canada Power Company, Showing Weir and Intake Dam.

The Western Canada Power Company, Limited, commenced the construction of a 50,000 h.p. power house in the winter of 1909-1910. The first section of this power house, comprising two units of 10,000 kw. capacity each, was completed and power was delivered in Vancouver on January 1, 1912.

During 1911 and 1912, the company built a distribution system comprising over 150 miles of pole lines and covering practically the entire district from Vancouver eastward along the Fraser Valley for a distance of sixty miles, and as far south as the international boundary.

During this period a large amount of power has been sold to new and existing industries, a contract for the sale of some 6000 h.p. has been entered into with the Puget Sound Traction, Light & Power Company, and a contract for the supply of power increasing in the course of several years from 10,000 to 40,000 h.p. has been made with the British Columbia Electric Railway Company.

After little more than eighteen months of operation the power plant at Stave Falls is loaded to its capacity, orders have been placed for two additional 10,000 kw. units, the work of extending the power house is under way and arrangements have been made to commence the construction of a second power house of equal capacity in 1915, so that the company will have ultimately an output of 100,000 h.p.

The power development is at Stave Falls, about six miles north from the junction of the Stave and Fraser Rivers at Ruskin, B. C., and thirty-five miles east of Vancouver City.

The mountains forming the watershed are granite; they rise high above the timber line, and are covered with snow and small glaciers. The upper river is a large glacier-fed stream, and several smaller streams empty into the lake, some coming direct from the glaciers on the high mountains on the west side of the lake.

Complete Development of Western Canada Power Company.

The lake is nine miles long and about a mile or more wide. The east and west shores are precipitous, but at the head and foot there were large areas of low-lying land, which were flooded during high water. From the foot of the lake to the Stave Falls the river is seven miles long, about two miles of this having been rapids, with a total fall of eleven feet, the rest being navigable at all stages of the river and having practically no fall. At the falls and the rapids, in the immediate vicinity of Stave Falls, the river drops eighty feet, and then continues on its course over a series of rapids for a distance of four miles, finally debouching through a narrow granite gorge into a tidewater basin, where it joins the Fraser River.

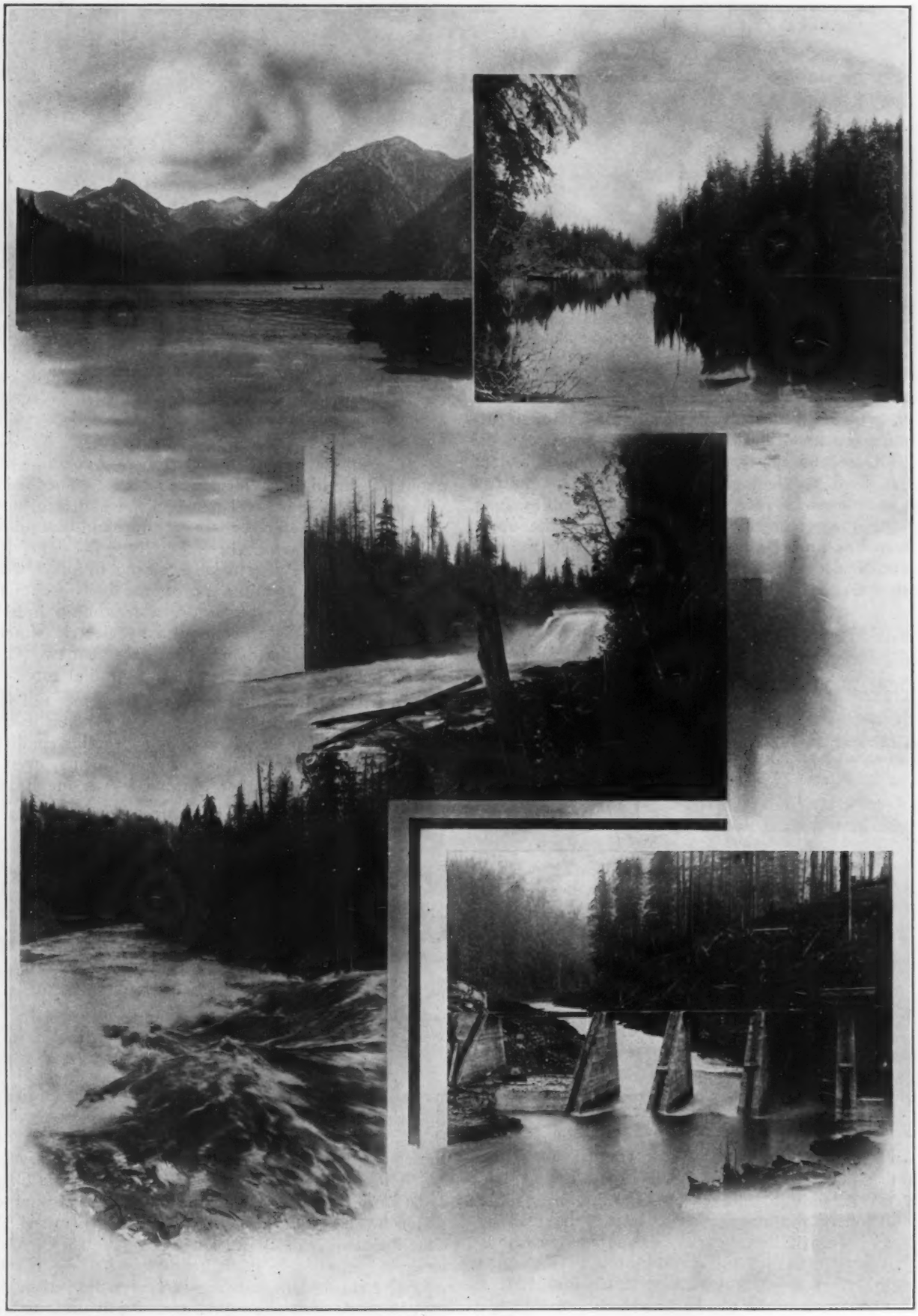
The total fall from the original low water level of the lake to tidewater was 225 ft., and when the dam, which has now been constructed, has been increased to its full height, the water will be raised 35 ft. above the low water level.

The dam will form a lake extending from Stave Falls to the upper end of Stave Lake, a distance of 16 miles. The area of the lake at the present height of the dam is about 13 square miles, and when the dam is completed to its full height the area will be 23 square miles. This reservoir will have a storage capacity of 14,000,000,000 cu. ft., which is large enough to store the flood water so that the total mean flow of the river will be made available for the generation of power.

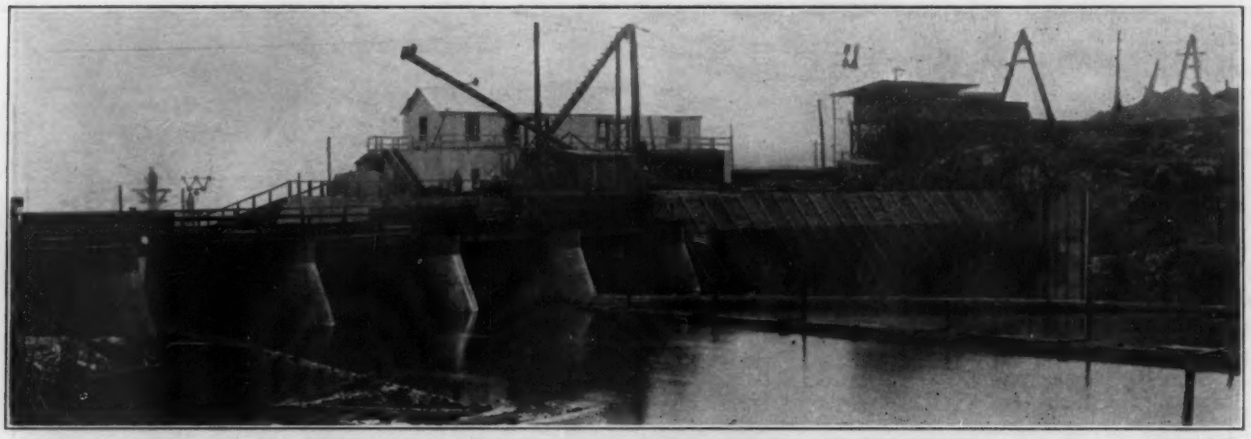
Daily gauge records of the flow have been kept for over six years, and during the past three years a careful series of checks, measurements, and computations have been made, which go to show that a mean flow of 3500 cu. ft. per second can be utilized for generating power.

The total fall from the lake to tidewater will be made use of in two power houses; the upper plant, which is now in operation, utilizing 125 ft. maximum and 105 ft. minimum head, and the lower plant utilizing the balance.

The site for the first development was chosen in the vicinity of Stave Falls, for at this point, the river is divided into two branches by a rocky island, half a mile long, admirably adapted for the construction of forebay and intake works while an old channel known



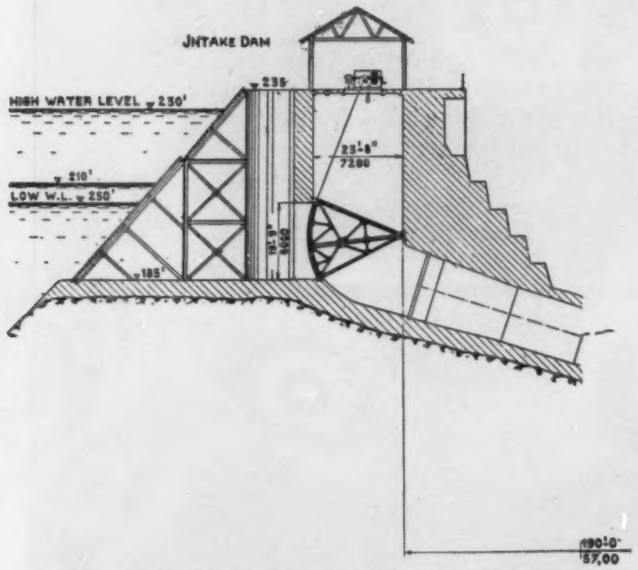
Whence Comes the Power



Upstream Side of Sluice Dam and Intake Dam, Showing Screens.

as the Blind Slough, with a rocky bed some 600 ft. wide at a higher level than the bed of the existing river, presents a most excellent site for a dam to provide for the flood discharge.

The second development will consist of a dam, 160 ft. high at the highest point, built in a narrow gorge to form a reservoir about three miles long, backing the water up to the tailrace of the upper plant. The power house will be located to the east of the dam, with its tailrace on tidewater, within sight of the main line of the Canadian Pacific Railway,



Elevation and General Plan of Stave Falls Power Plant.

and the penstocks for the turbines will be laid in tunnels about 1600 ft. long.

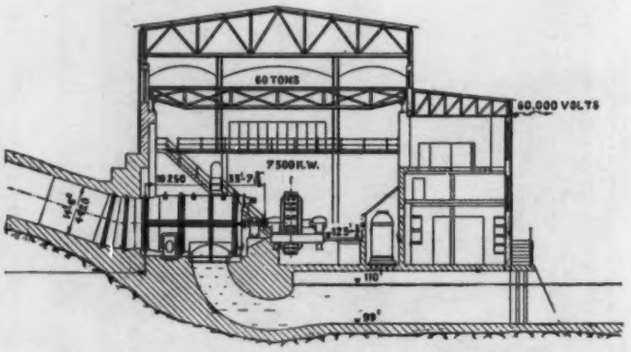
Description of the Power Plant.

The power plant, as it now stands, consists of a sluice dam 40 ft. high, provided with five sluice ways 22 ft. wide, to take care of the flood discharge; a solid concrete intake dam; two 14 ft. 6 in. steel penstocks with provision for two more; a power house with two 10,000 kw. units and provision for extension for two more; and a tailrace channel 1500 ft. long excavated in the old bed of the river.

The sluice dam, which was partially built by the Stave Lake Power Company, consists of four concrete piers, 8 ft. wide, with two abutment piers, the spaces between the piers being filled with 24 in. stop logs, 24 ft. long, which can be removed by means of a specially designed electric winch to permit of the passage of flood water.

The intake works consist of a solid concrete dam about 70 ft. high at its lowest point, embedded in which are the four steel penstocks, which are belled out to 19 ft. diameter at their entrance and taper down to 14 ft. 6 in. diameter where they leave the dam. The entrance to these penstocks is closed by steel radial gates, closing an opening approximately 20 ft. square, and designed to operate under a maximum head of 45 ft. These gates are operated by electric winches set on the top of the dam. There are also two 42 in. exciter penstocks which are closed by radial gates.

In front of the radial gates are set screens of very large area. No special precautions are taken to protect the screens from ice, as it is a peculiar condition of the Stave River that no ice ever forms, even at times when zero weather obtains for as much as a

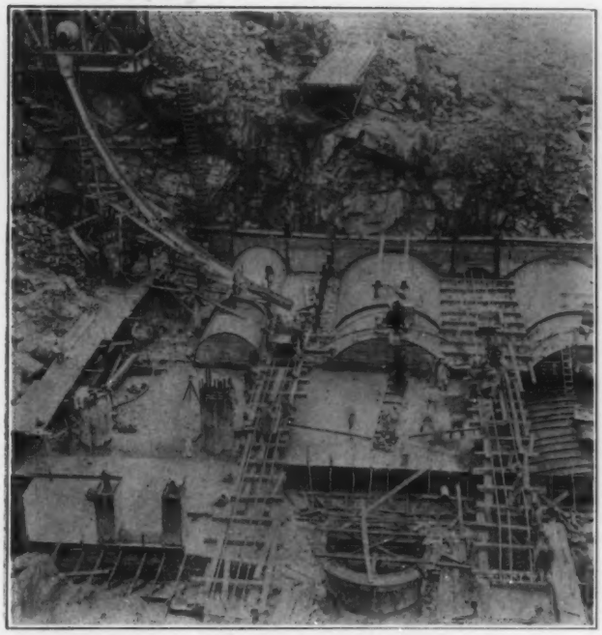


week. The reason for the non-formation of ice is that there is a large underflow from the forest during the winter months, which raises the temperature of the water.

These dams are at present built to such a height as to store the water about 8 ft. above the original low water level of the lake. They are being raised this year an additional 10 ft., and next year they will be extended another 25 ft. in height.

The sluice dam in being carried to its full height, will be made into a solid dam, and will no longer be used for flood discharge.

Next year a sluice dam will be built across the Blind Slough. This will consist of concrete piers



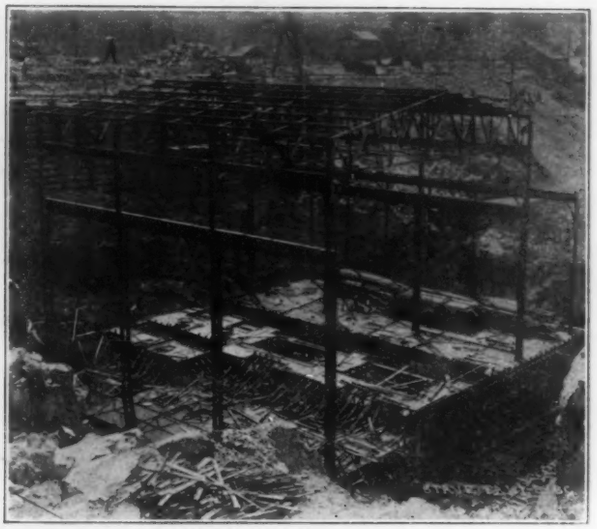
Pouring Concrete for Power House Foundations.

30 ft. high, making 14 sluice ways, each closed by stop logs, which can be removed by an electric winch. Provision will be made in the design of these sluice ways, so that a Stoney roller gate can be placed in any of them if it should be advisable. But the operation of the stop logs has proved so economical and successful for handling floods, that it is not likely that more than one of the sluice ways will be closed by a Stoney gate. The Blind Slough dam will provide for a maximum discharge of 100,000 cu. ft. per second.

The foundations for the power house were excavated in solid rock. The total quantity of rock excavation for the penstocks, power house and tailrace amounting to 75,000 cu. yds.

The tailrace canal is 70 ft. wide, and designed to run 10 ft. deep when all four units in the power house

Riveted Steel Penstocks.



Steel Superstructure of Power House.

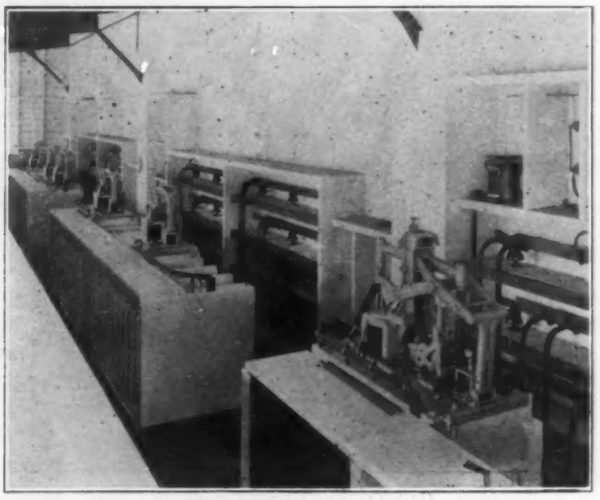
are in operation. In addition to the rock excavation for the tailrace some 75,000 cu. yds. of sand, clay and boulders were excavated by steam shovel.

Just below the power house a small V-shaped weir was built to hold the water to a proper height to seal the draft tubes. At present the flow of the river is rapid from below the foot of the tailrace, but when the lower plant is built, the water will be backed up to this weir.

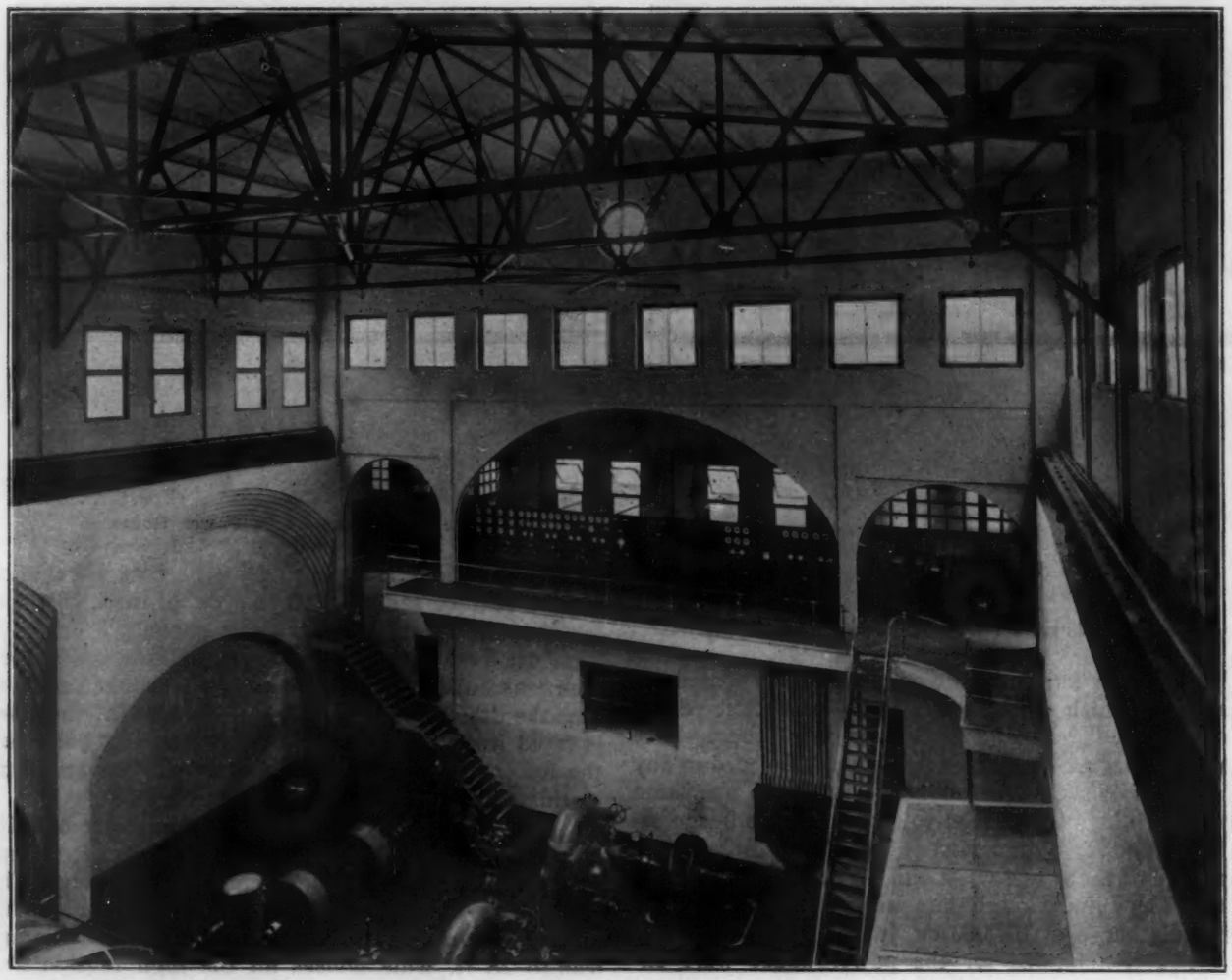
The foundations for the power house are of solid concrete construction, and the superstructure is a combined formation of steel and reinforced concrete. The building is 100 ft. wide by 90 ft. long. The turbine and generator room is 75 by 90 ft. and a two-story lean-to 28 ft. wide houses all the high tension and low tension switches. The control switchboard is on a gallery in a lean-to at the end of the building.

The power house is now being extended 70 ft. more for the installation of two new units.

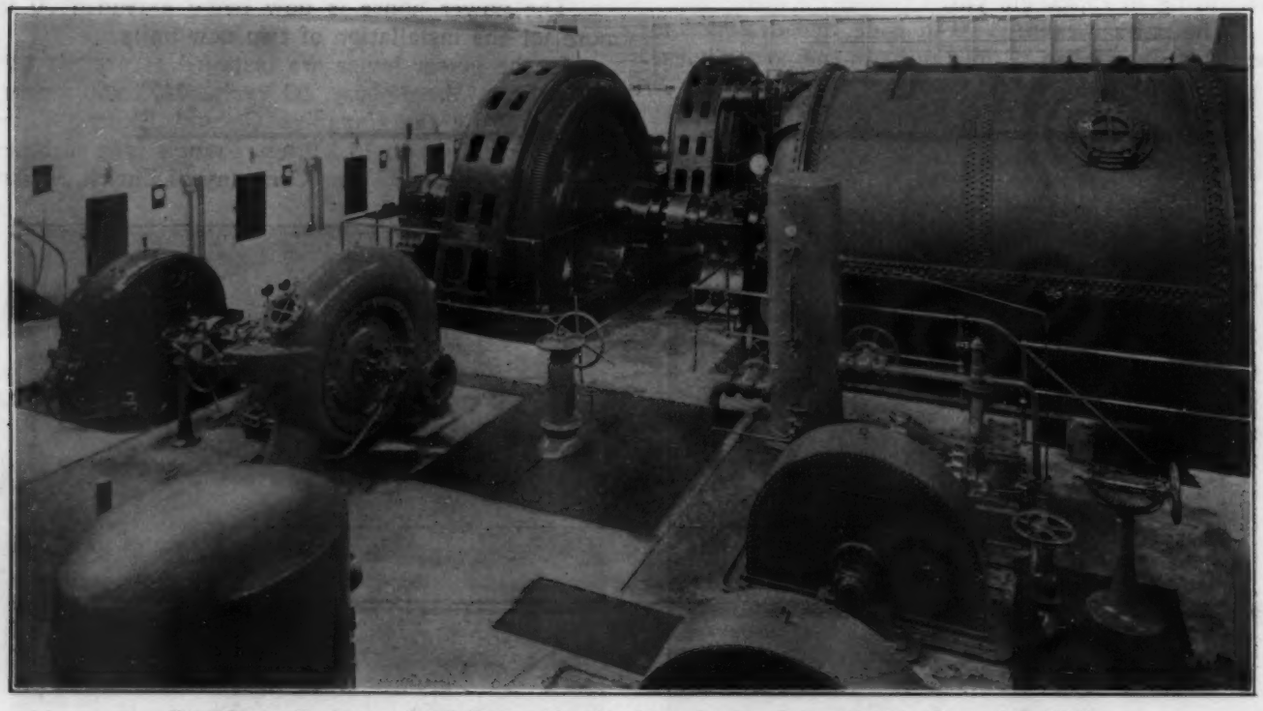
In the power house are installed at present two 10,000 k.v.a. three-phase, 60 cycle, 4400 volt generators built by the Canadian General Electric Company, driven by two 13,000 h.p. Francis type turbines built by the Escher Wyss Company of Zurich, Switz-



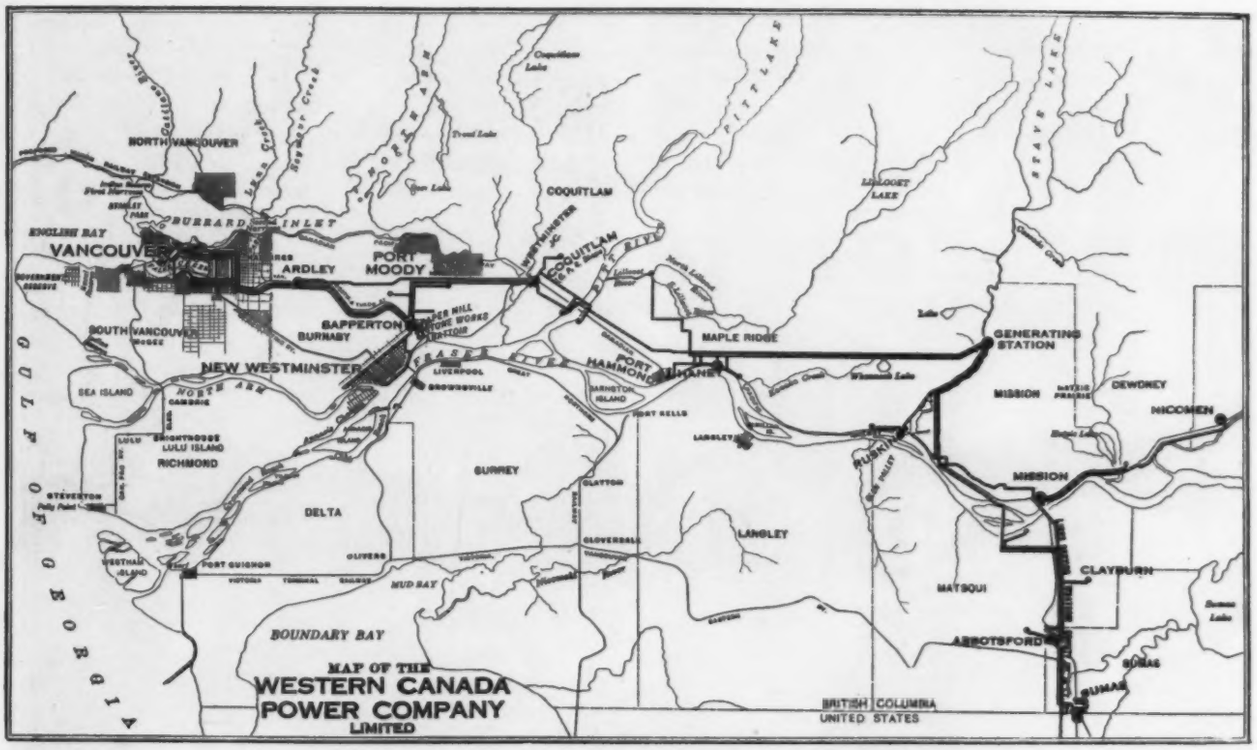
Low Tension Switches and Connections at Power House.



Switchboard Gallery at Power House.



Generators, Exciter and Oil Pump, Showing Transformer Compartments Along Left Wall.



Map of Transmission Line of Western Canada Power Company.

erland. Excitation is provided by two 250 kw. 125 volt generators, each driven by its own turbine, and each capable of exciting four machines. Governors and oil pumps were also provided by the Escher Wyss Company, the pumps being driven by individual wheels of the impulse type.

Six single-phase transformers of 3000 kw. capacity each are located on the main floor, each in its own concrete vault with a steel hatch as a top. A travelling crane of 70 tons capacity spans the entire main floor, placing the transformers as well as the generators and wheels directly under the crane. The control switchboard is in a gallery at the east end of the building, giving the operator full view of every piece of moving machinery. All switches are solenoid operated, and with the fuses are located in reinforced concrete cells in a concrete lean-to parallel to the main building.

There are at present three 60,000 volt, four 13,000 volt and one 4400 volt lines leaving the station. The 60,000 volt circuits leave by means of roof bushings through the concrete roof of the lean-to, choke coils being mounted directly above the roof bushings. The 13,000 and 4400 volt exits are made through the roof in three-phase lead armored cable terminating in D. O. A. terminals mounted on a pipe rack on the roof. This construction has proved to be satisfactory, a year's operation under severe weather conditions showing no faults.

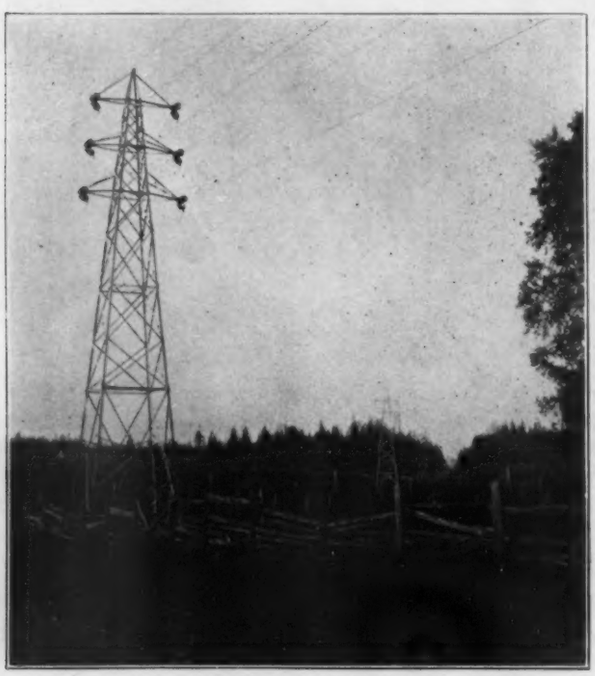
The main 32 mile transmission line terminates at the receiving station at Ardley, a point on the Great Northern Railway almost equi-distant from Vancouver and New Westminster.

Standard steel transmission towers spaced 660 ft. where possible, carry 2 three-phase circuits of No. O hard drawn, stranded copper cable with hemp center and one ⅜ in. galvanized steel ground wire, the overall height being 59 ft. and the point of support of the lowest wire being 41 ft. above the ground. For dead ends or sharp angles anchor towers capable of withstanding twice the strains of the standard tower were used.

High Tension Gallery at Power House.

Pitt River Crossing, Showing 165 ft. Tower.

The Pitt River, a navigable stream, is crossed on a span 1360 ft. in length, and as it was necessary to provide at least 100 ft. clearance at the lowest point of the span a special construction was resorted to. A galvanized steel tower 165 ft. overall in height, the low wire being suspended 140 ft. above the ground, was erected on a concrete and pile foundation on each bank of the river. A rocker tower is set so that the cables used at the crossing, which are of ½ inch plow steel, are at an angle of 45 degrees at the main line, the main span being dead ended at the rocker tower on each side, and being free to move longitudinally on the supports of the main tower so that these act simply as struts and have no strain due to the line itself. It was necessary to hang two sets of insulators in parallel, connected with compensating links, for each point of support and for the dead ends of this crossing, as the strains were too heavy for a single set of insulators. The rocker towers are securely anchored by 1 in. steel cables to concrete and pile anchors. All the insulators and hardware were supplied by the Ohio Brass Company, three of the ten-inch suspension discs being used in straight line construction, and four discs on strains. The towers were built by the Riter Conley Company of Pittsburg.

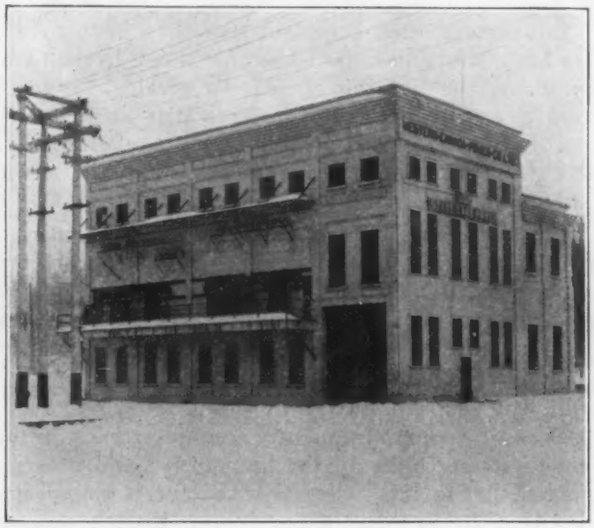


Anchor Tower at Angle.

The third 60,000 volt line runs south to the international boundary where it connects with the line built by the Puget Sound Traction, Light & Power Company into Bellingham, the total distance being 47 miles. This is constructed on wooden poles set on an average span of 200 ft., the longest span being 970 ft. at the crossing of the Fraser River, the supporting poles here being 130 ft. in height. Pin type insulators are used, the conductor being a No. 1 equivalent, steel core aluminum. Since this line has been in service it has had to withstand a seventy mile gale, with a temperature of approximately 32 degrees F., and in two other instances has had an accumulation

of sleet and snow so that the diameter ran up to over two inches without showing any signs of distress.

Thirteen thousand volts is supplied for local distribution from the power house to a distance of about 20 miles, the industries supplied being lumber mills, brick-yards, drainage pumps, quarries, etc., besides light and small power in the villages through

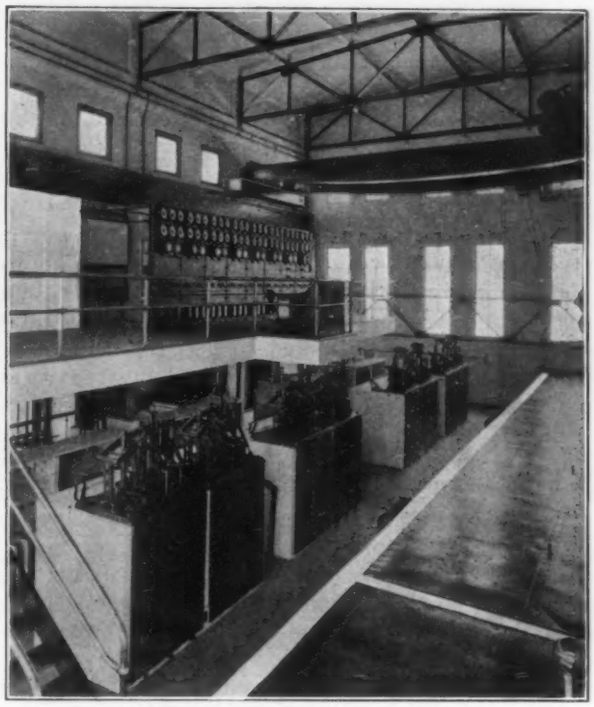


Receiving Station at Ardley, Showing 12,000 Volt Outgoing Lines.

which the lines pass. No substations are used on these lines, the transformers reducing to 2300 volts being outdoor type, placed on pole racks as near as possible to the service. In one or two cases, where the consumer has sufficient installation to warrant keeping an electrician, water cooled transformers, attended by the consumer's electrician, are placed in small corrugated iron buildings. It has been found that this method of distribution is much more satisfactory, due to the nature of the country and the character of the business, than the more generally used system of installing larger substations at intervals and radiating from these substations with 2300 and 4000 volt lines. Substation operators are thus eliminated, the patrolman on whose district the transformer is located, looking after it, and copper is cut to a minimum, the decrease in copper losses about equalling the increase in transformer losses.

Six 13,000 volt lines leave the main receiving station at Ardley, four running to Vancouver and two to New Westminster where the voltage is stepped down in small substations to 2300 volts for local supply. Power is distributed from these substations in 2300 volt, three conductor, paper insulated, lead covered, steel armored cable, laid directly in a trench 30 in. deep without any conduit or duct, services being laid in the same manner that a water pipe would be, tee box being used for making the joint. Section boxes installed at suitable intervals make it possible to isolate short sections without interfering with the balance of the cable.

As the company is primarily looking for power business and not for lighting, very little secondary cable is necessary, the majority of the services being at 2300 volts. Where secondary services are required transformers are placed on poles either on private property or in lanes, the cable service terminating in suitable cable pot heads. The secondary also is underground in the shape of a four conductor cable, star connected for 115/200 volts, connections on these cables being made hot. Very little cable trouble has been experienced. There is in operation at the present time about 25 miles of cable.



Interior Ardley Switching Station.

There is in operation at the present time 90 miles of 60,000 volt circuit (exclusive of the Whatcom County lines, which aggregate 125 miles) 138 miles of 13,000 and 246 miles of 2300 volt circuit, with 7658 poles. There are connected to these circuits 1157 customers, requiring 1551 meters and 574 distribution transformers, with a kilowatt capacity of 7606, exclusive of 13,000 volt stepdown transformers. The maximum demand on the power house to date has been 16,000 kw.

It is impossible in an article of this kind to go into details or to give more than a general idea of a large system, and consequently a number of photographs and sketches have been included which it is hoped will elaborate these notes and give the reader a much clearer idea of the layout of the Western Canada Power Company, than it is possible to do otherwise.

Rope drive, properly designed, is efficient and few ropes can be run on a drive with good efficiency. economical, especially where considerable power is to be transmitted, and where conditions are favorable to its installation no other known method of transmission will so well conserve power losses. The efficiency is greater at lower speeds than at higher, the dropping off being especially noticeable above 4500 ft. per min. of rope speed. The efficiency is not materially effected by distances between center up to 150 ft., and if proper care is exercised to have all grooves perfect in pitch diameter, many as well as

ELECTRICITY AND THE ARCHITECT.

BY C. S. WALTON.[1]

It may generally be said that the architect in America is always alert and ready to adopt any new and practicable device which will add to the comfort and convenience of the occupants of the buildings designed by him.

In no other country are there so many modern conveniences provided in plans and specifications, and it is due to this fact that the luxury of yesterday has become the necessity of today, and it is true that were it not for the watchfulness of the architect and his ability to see ahead and provide for future developments along certain lines our houses would be out of date in some respect before they were fairly occupied.

In Southern California the small house (on a large lot) has reached its highest development. The so-called bungalow is not a summer cottage for temporary occupancy, but is an artistic little home, substantially built, and designed to satisfy the requirements of people who are used to and must have all the conveniences and comforts. The transition from the bungalow to the palace is gradual and runs through a variety of houses, charming in aspect and perfect in appointment, but the bungalow must be so planned that its occupants may enjoy in a measure the same comforts as those who dwell in more pretentious structures. The reason for this is found in the fact that a large portion of our population is made up of well-to-do people who come here for the climate and for rest. They have had big houses and have struggled with the servant question and the social whirl and now they want peace and quiet, with sunshine and flowers and that freedom from care which the small home provides.

The architect has done wonders in developing this home along practical as well as artistic lines. It is a home for both the well-to-do business man, active or retired, and the man on a salary. Let us go through one of them and discuss its electrical requirements, having in mind the fact that electricity is now very cheap and may be used freely, if not wasted, without producing an unreasonably large bill at the end of the month.

The wasting of electricity is not well understood. Most people feel that if they turn off the current when they have finished with it all waste is stopped, but they do not know that their lights may be using twice as much current as would be necessary if they were properly placed and the glassware was of a character to give the best results in an economical way. Improperly placed lights and unscientific glassware will every day waste as much current as all other appliances in the house consume. In this one respect the architect can save his client a very considerable sum every month.

Speaking of appliances, and by this is meant all the various electrical devices which perform useful service in the household, they use very little current, and as their use is for a comparatively short time, the cost of running them is small compared with the service they render.

[1]District Agent Southern California Edison, Company.

Illuminating engineering is a well-developed science. The engineer will take the dimensions of any room, and after learning the use to which it is to be devoted and the general color scheme of ceiling and side-walls, will quickly determine the proper location for the lights, their size and the type of reflecting glassware necessary to give exactly the right illumination without wasting the light where it is not needed.

Consumers often complain that they have to use extra large lamps in order to be able to see to read and they blame the lighting company's service. Investigation generally develops the fact that an ordinary lamp, if properly placed, would supply ample light for reading fine print and the consumer is simply the victim of an unscientific lighting arrangement.

From the viewpoint of economical use of current for light, and this is an item that must be met every day, dark side-walls that absorb light without reflecting it are responsible for doubling the lighting bill. This is an ultra-conservative statement of a scientific fact, and besides the dark walls are depressing and are unsuited to the Southern California home.

Scientific papers frequently contain articles on the effect of strong light on the human eye and it is recognized that in this generation the eye is being subjected to a strain many times greater than it was intended to stand. What the ultimate effect of this unnatural condition will be is easy to predict, but it may be greatly improved by the illuminating engineer who always takes this fact into consideration when preparing a lighting scheme.

From the foregoing it will clearly be seen that much of the comfort and well-being of a household, as well as its economies, are dependent on the architect, and if he is not an illuminating engineer he will do well to consult with one.

The Southern California Edison Company has several high-grade illuminating engineers in its forces whose services are at the disposal of architects and the public without charge. These men have solved many difficult lighting problems for architects and have effected large economies which were greatly appreciated by the company's consumers.

Let us take a look at that bungalow. It is night and we will drive to it. We have some difficulty in locating it because the porch light is not burning and we cannot see the number. As we get out in front of the house the porch light is switched on, but still we cannot see the number because it is in the wrong place and the light does not strike it. House numbers should always be located where the porch light will illuminate them. How many times have you had to lay down an interesting book or interrupt a quiet little game to inform the inquiring stranger at the front door that the number he is looking for is in the next block?

The porch light is one of the most useful lights about the house. It gives the place a cheerful look and is better than a night watchman to keep prowlers away. If all the houses in the block burned their porch lights all night robbers and thugs would select some darker neighborhood for their work. This idea has received the cordial approval of the police departments of many cities. To burn a porch light all night

costs much less than one would think. Let us figure it:

Take a twenty-five watt lamp, which consumes twenty-five watts an hour, for, say twelve hours, which makes 300 watts a night. For thirty nights it would amount to 9000 watts, which equal nine kilowatt-hours for a month. Nine kilowatt-hours added to the monthly bill would be a small addition for the results obtained; much less than you would pay for a watchman.

Let us ring the door bell. We hear its sound and know that some one will answer. The architect has located it where it may be heard in every room and it is rung by the lighting current through a little bell transformer; no dry batteries to give out and the cost of the transformer paid many times in saving in repairs to bells and batteries. The amount of current used could hardly be measured and it lasts forever.

We are in the living room which is quite large. How pleasant is the light from the semi-indirect fixture. It is reflected from the ceiling against the side-walls and shows the pictures perfectly. There is not a light in the room to glare into the eyes; you can face in any direction without being blinded. On the table is an ornamental lamp connected with a receptacle in the floor, while on the upright piano is a lamp which lights only the music and keys and is connected to a receptacle in the baseboard. A well-shaded standing lamp by a grand piano will be both ornamental and useful. The baseboard receptacle will be needed in the day time for connecting the portable vacuum cleaner which is in such general use.

We pass into the dining room where electricity finds a dainty use in preparing many things for the table. The supply of current comes from the floor and the dining table is wired so that at a convenient point under the edge are several receptacles to which may be attached the coffee percolator, the toaster, the chafing dish, the griddle and the small stove. Ornamental lights for the decoration of the table may also be attached to these receptacles.

If there is objection to bringing the floor plug through the rug the floor receptacle may be located at the edge of the rug and one heavy cord run to the table receptacles. The floor receptacle should then be so located that the cord will run under a chair at the head or foot of the table where it will not be in the way of a person moving around the table.

A receptacle in the baseboard supplies the current for an electric fan, or a luminous heater to take the chill off a cold room on a cold morning, besides being useful for the vacuum cleaner.

In the kitchen the use of electricity becomes greater every day. The electric stove is now perfected and practicable and is economical in the consumption of current. It will do all the cooking, but is not adapted to boiling large quantities of water, which should be done by gas. Many homes have electric ovens and fireless cookers built into the walls, where they take up no room and are a great comfort and convenience.

Over a shelf against the wall is a row of receptacles to which may be connected any or all of the appliances used in the dining room and in addition the electric iron, knife grinder, silver polisher and the ice cream freezer, as well as the fan.

On the back porch is a receptacle for the electric iron, the washing machine and wringer, which are in very general use. The small electrically operated refrigerator, using no ice, is on the way and must be provided for.

Sufficient thought is rarely given to the supply of electricity in bedrooms. A well-planned home should have two baseboard receptacles in each of these rooms, one by the bed for the heating pad, vibrator and milk warmer, and another by the dresser for the curling iron, fan, shaving mug and ozonator, and for the sewing machine motor if there is no sewing room in the house. The vacuum cleaner and possibly the electric iron will be used in every room.

Sleeping porches should also be provided with a receptacle as the heating pad is indispensable in taking off the chill of the bed and driving away dampness.

The bathroom should have one receptacle for the vibrator and luminous heater, the shaving mug and the immersion heater.

Every closet should contain one well-placed light and particular attention should be given to the location of the telephone so that it may have a light near at hand.

The garage should be connected to the house by a three-way switch so that the lights may be turned off or on at either point, and the light should be located at the corner of each building in such a way that no dark places in the yard will afford a hiding place for prowlers. Such an arrangement will be found most useful in going to or from the garage and in illuminating the yard in case of attempted burglary.

Appliances should never be attached to lighting fixtures, as the fixtures will soon get loose and out of order and are not wired heavily enough to carry the necessary current safely. Receptacles in the dining room, kitchen and screen porch should be on circuits of extra heavy wire separate from lighting circuits, in order to carry ample current and possibly to effect a considerable economy in event of specially low rates being made for current used for other purposes than light. It is important that receptacles, except those designed for some specific purpose, be all of the same type and size, as nothing is more annoying than to find that a certain receptacle will not receive some appliance without a change of the plug.

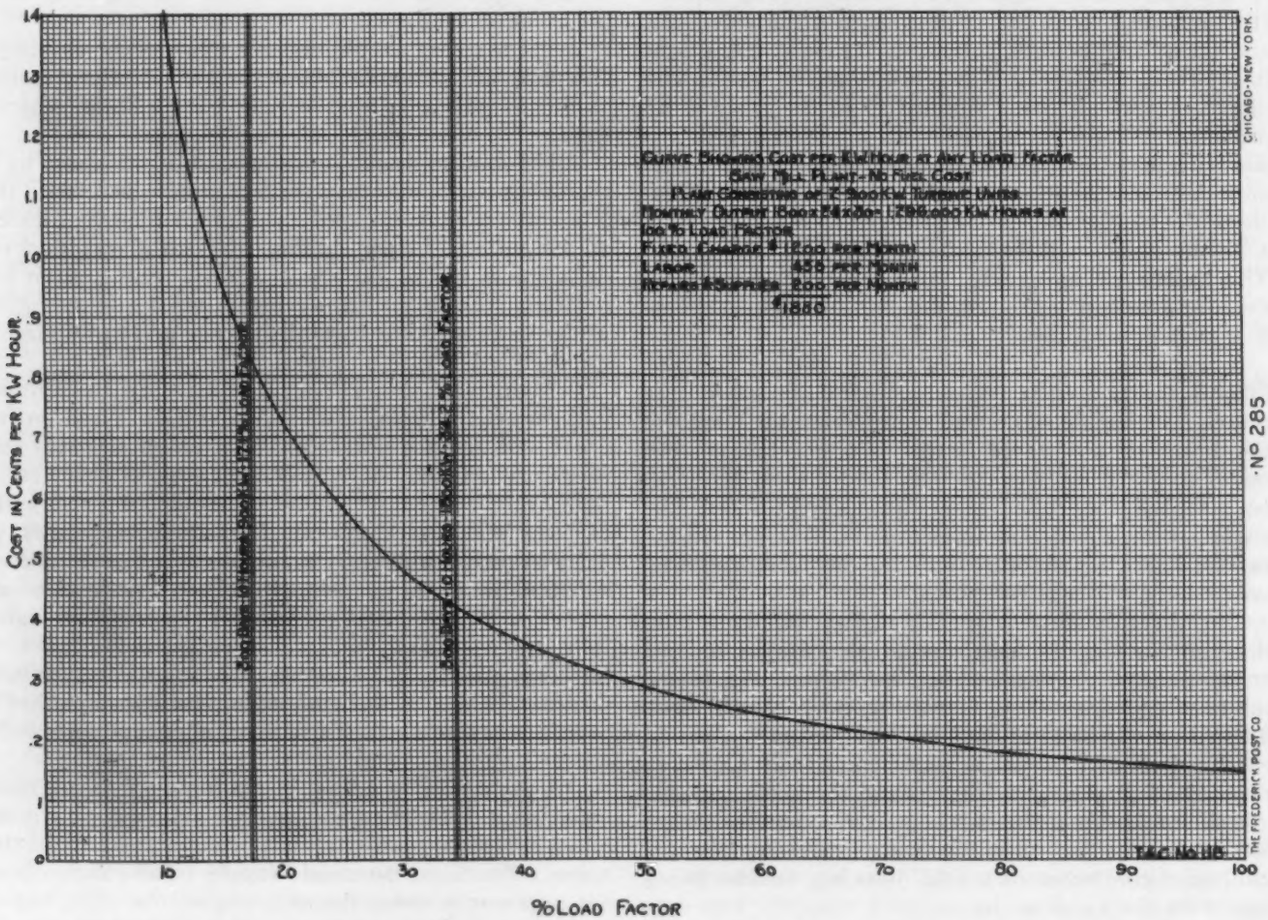
A good rule to follow in planning a home is that when all the lights are turned on there will not be found a dark or poorly lighted place in any part of the house. Providing an ample supply of electricity does not necessarily mean the extravagant use of it, but it means convenience and comfort, and if the house is offered for sale it will surely be a most attractive feature to the possible purchaser.

The ample wiring of a house should be considered of the utmost importance and it should be done when the house is being built, as it is very expensive, unsightly and sometimes almost impossible to add to the wiring after the plastering has been done. The difference in first cost between a poorly and a well-wired house is small in comparison with the added convenience and attractiveness of the latter, and it is not an exaggeration to say that insufficiently wired houses will soon be considered old-fashioned just as were the houses of a few years ago that were not piped for gas.

ELECTRIC POWER FOR THE SAWMILL.

The question is frequently asked whether a sawmill can generate electric power from mill refuse more cheaply than it can be bought from a central station. The following facts are intended to prove the affimative answer:

For example, consider a steam turbo-generator plant consisting of two 900 kw. units with a condenser equipment capable of maintaining 27 in. vacuum with 65 degree water. The boiler plant would consist of four 400 h.p. water-tube boilers, together with feed pumps, piping and feed water heaters. These, together with switchboard, station wiring and concrete building construction would constitute a complete plant which could be turned over to the customer in operating condition at a total cost of $120,000, exclusive of real estate.



It is possible that, owing to the load factor, it would not be necessary to install as many boilers as we have figured on. Many sawmills operate with no mill man how he liked the engine. He said it was fine. He then asked if its economy came up to his statespare boiler capacity and figure to clean nights and Sundays.

The accompanying curve shows the cost at various load factors and, of course, no account can be taken of fuel, as the mill people do not figure this item. In fact, when they figure to purchase current, there should be some charge for getting rid of excess fuel. It reminds me of the sawmill man that purchased a Corliss engine and was told how much more economical this engine was than the old slide valve engine that the new engine replaced. After the unit was installed some time, the salesman asked the sawments and was answered that it did. The sawmill man then told him that it cost him more to run his plant with the Corliss than it did with the old slide valve engine as he now had to have two teams to haul away excess fuel. From the above you will gather that if a sawmill purchase current they will be put to certain expense in getting rid of extra refuse and any such cost should be added to the price for current.

There is no reason whatever why we should install reserve capacity on a sawmill plant, as the turbines will run just as many hours per year as a Corliss engine and no mill man thinks of installing a reserve engine. Reserve capacity is essential in a lighting and power plant where they must maintain continuity of service. On the above basis, we are justified in estimating that this plant will carry 1800 kw. If the plant operates three hundred 10-hour days, this is an annual load factor of 34.2 per cent. If they keep one unit in reserve and operate 900 kw. three hundred 10-hour days, this gives them an annual load factor of 17.1 per cent. At 34.2 per cent annual load factor, $1850 per month plant charge, we have a cost of .417c per kilowatt hour.

The $1850 per monthh charge is arrived at, as follows:

Fixed charge at 1 per cent per mo, $120,000	$1,200.00
Labor	450.00
Supplies, repairs and incidentals	200.00
	$1,850.00

Other items, of course, might be added, but the above figures are sufficiently high to cover water, extraordinary repairs and anything of that nature. $450 per month labor charge for a plant of this size is excessive and $200 per month for supplies, repairs and incidentals is certainly high, so no one could question the monthly charge of $1850, except to say that it was too high.

The units on which we have estimated would be good enough for a lighting plant with the average load factor and the condenser equipment is certainly ample, and under ordinary conditions existing in a sawmill plant, this could be materially reduced.

The allowance for the building is $16,040, the contractor's profit to be added to this amount.

From the above analysis you will see that everything is figured liberal and we believe that under certain conditions where a party would not want such a fancy building and in the event they did desire a 100 per cent reserve capacity in turbine units, by trimming the plant down to the last cent, we could build such a plant at approximately $60 per kilowatt. The above figures are for power plant only and do not contemplate cost of real estate, storage bins or conveyor system, but do include the buildings, apparatus and everything necessary and essential to deliver current to the outgoing feeders.

PORTABLE ELECTRIC LIGHT LAMPS.

The United States Bureau of Mines has recently issued a Technical Paer, 47, by H. H. Clark, electrical engineer, entitled Portable Electric Mine Lamps. The paper states that the development and use of portable electric lamps for mines is just beginning in the United States and that the Bureau of Mines is interested in the subject because the Bureau believes that the safety of mining operations will be largely increased by the abandonment of flame lamps, except for gas testing, and the substitution of portable electric lamps. The locked safety lamp is the only portable lamp now used underground that is comparable as regards safety with a well constructed portable electric lamp. The author of the paper considers that the portable electric lamp is safer than the safety lamp.

To quote from the paper: "Even the locked type of safety lamp has its weak points. The omission or improper adjustment of some part may render the lamp unsafe and this condition may be effectually hidden from the user of the lamp and continue to exist until the lamp is opened and readjusted. The user has no means of detecting imperfect arrangement of lamp parts and must depend for safety upon the one whose duty it is to prepare the lamps for use. Reports indicate that safety lamps are not always properly adjusted in the lamp house—the filament of portable electric lamps is normally surrounded by a vacuum which as long as it exists absolutely prevents gas from coming in contact with the filament. If the vacuum is destroyed, the fact becomes evident in a few seconds at most, because the filament becomes dim and soon ceases to glow. Thus there is inherent in the construction of the electric lamp an effectual safeguard whose disappearance is announced automatically, unmistakably, and without delay. Moreover, though the destruction of the vacuum may give rise to a condition of potential danger, the air that takes the place of the vacuum removes the condition in a short time by causing the filament to burn in two. Therefore, it is not only impossible for the user of a portable electric lamp to remain ignorant of its unsafe condition, but it is also impossible for the unsafe condition to endure for more than a fraction of a minute.

"Although an electric lamp cannot be regarded as a safety lamp, if the latter be defined as a lamp that detects the presence of gas without igniting it, still if the presence of gas is known a well constructed portable electric lamp, even without special safety devices, would seem to be quite as safe as a safety lamp because while either may possibly ignite gas as the result of an accident, an unbroken safety lamp may cause disaster if its parts are improperly arranged."

The paper reviews the possible sources of danger in portable electric lamps and declares that the glowing filament of the bulb is the only source of danger as far as the ignition of gas is concerned. The paper recites at some length the author's experiments as to the ignition of mine gas by such sparks and arcs as could be obtained from the batteries of portable electric lamps even when the latter were short-circuited. The results of these experiments show quite conclusively that a portable electric lamp equipment whose battery potential does not exceed six volts could not produce a spark sufficient to ignite mine gas. Technical Paper 23 and Bulletin 52 of the Bureau of Mines show that certain sizes of miniature lamp bulbs are capable of igniting explosive mixtures of mine gas and air if the bulbs are broken so that their filaments are not injured. The author points out that if the bulb of a portable lamp is properly protected by its reflector and a stout outer glass, it would be a noteworthy exception if a blow that broke such a bulb failed to destroy its filament also; while noteworthy, it is however possible. The paper states, however, that not even that remote contingency need be feared if the mounting of the lamp bulb be so designed that a blow sufficient to break the bulb will at the same time short circuit it or open the electric circuit of the lamp. It is not yet certain whether the hand lamp or cap lamp will be more popular in this country. In Europe the hand lamp is used almost exclusively but the sentiment in the United States seems to favor the cap lamp, probably because there are so many open light mines in this country.

"After safety the next consideration is the production of a proper amount of light for approximately ten hours on one charge. The next is reliability of service, which is followed by lightness and durability. Convenience in handling and charging is an important characteristic. The outfit should not leak or spill electrolyte and it should not be necessary for the users to exercise care to prevent such leakage. In batteries that cannot be overcharged without injury, condition of charge is important in order that the batteries may not be continually overcharged and overdischarged to the detriment of the elements. Finally it is desirable that a battery should hold its charge during long periods of idleness.

EFFICIENT MANAGEMENT.

BY T. E. BURGER.

"Management" needs not the modification "efficient." Of necessity management must be efficient, otherwise it is not management but mis-management. Admitting then that efficiency is an integral feature of management, my definition and formula is simple; merely this:

Get the manager. Find the man and the rest is easy.

To analyze this formula offers a fine opportunity for patiently plodding through a panorama of platitudes. But as the mere recitation of truisms does not leave us with any tangible ideas from which can be gleaned applications for personal benefit, I will endeavor to hold forth on the attributes, characteristics and virtues essential in the man.

Let's put them down nakedly and justify them later.

1st—Integrity. 2d—Brains. 3d—Judgment. 4th—Energy. 5th—Imagination. 6th.—Sobriety.

First of all—yesterday, today and forever—integrity; that one paramount virtue which forms the basis of credit. The man of questionable integrity is handicapped far beyond the possibilities of his own conception and is bound sooner or later to fall. To fall does not necessarily mean that he cannot steal himself into a position of notoriety and perhaps retain his ill-gotten gains for life. But I maintain that in those things worth having; the esteem of his fellowmen, the confidence of his townsmen and, most of all, the approval of his own conscience, he is an utter failure A man of this type cannot be named without someone saying "Yes, but he is a crook," So the first fundamental cornerstone of success is business integrity.

Let those who think that any other attribute of a manager takes precedence, in importance, to integrity, think on. The fact remains that life is just one short step from the cradle to the grave, and is there time to dissimulate? "To thine own self be true, then canst thou not be false to any man."

A manager must of necessity live up to his definite characteristics, one of which is to be an adroit schemer. But all his schemes for the successful conduct of his work may be honest ones which in no sense could be so construed as to cast a shadow on his integrity.

Let us deal with the second most important characteristic of the manager. Gray matter in the cranium; chemically defined as chalk and water but commonly known as brains. There are lots of fools rattling round in jobs too big for them, but successful business establishments cannot long survive with an empty-headed ass in control. Some of these fellows are monumental bluffers but sooner or later the day comes when they are weighed in the balance and found wanting.

What we must have is a real trousered man at the head of things. A man placed there because of efficiency, for I deny that a "pull" of any sort can keep the incompetent man at the head of a successful business. "Pull" may place him there but a natural law will pull him out, or the business will go to pot.

We Americans, particularly the younger generation, are in such a hurry to achieve that we chafe under the necessary apprenticeship so important to future success. We all, if God has given us our birthright in brains, want to be captains of industry in from one to six months after getting a desk. Yet it is safe to say that none of our great business managers, except prodigies, ever reached their eminence without a long and arduous struggle.

It is only through this necessary and, what should be, enjoyable life labor that our mentalities are developed to a point where we can cope with the world as we find it, properly direct the efforts of a business organization and after each day's effort sit back with an honest realization of having put into our work all our endowment of mental activity at its high water mark of efficiency.

Our third attribute is judgment. This is not always an accompaniment of brains, though some may think so. Errors of judgment are common to us all, but I make the point that the more successful the business man the fewer his errors of judgment.

Here is involved the ability to think rapidly and clearly with the power for quick decision. Brains without judgment will achieve something sometimes. Brains plus judgment will accomplish something every time and hit the bull's eye nine times out of ten.

In judgment lies fifty per cent of a man's executive ability, that most essential feature, without which none of us would rise very far from the desk of a clerk. The ramifications of a manager's judgment are multifold and these subdivisions are called into play for every important feature of his work.

There's judgment in hiring his employees, judgment in firing them, judgment in his attitude toward them, judgment in analyzing his business, judgment in supervising the relations of his representatives to his trade, and judgment in deciding all of the numerous daily questions coming up on every hand.

A good executive, every manager must be and ability of this nature cannot exist without good judgment.

Men with this quality well developed do not become inflated with success and go to extremes of expansion, nor do they become unduly depressed by criticism or failure and go to the opposite extreme of panic-stricken retrenchment.

Grover Cleveland said that "The best executive is the man who can find others to do his work as well or better than he can do it himself." So here's where judgment has to come out good and strong in selecting the proper people to specialize on the various features of your routine until they are experts, each in his own department..

Our fourth qualification is energy. There are two varieties of this virtue, well directed energy and the other, which is one of the worst faults in business, misdirected energy. We have all seen men whose sole occupation seemed to consist of running a private marathon in circles, disturbing an entire establishment and creating discontent at every jump. Energy properly disposed is to be likened to a constant-speed, smoothly-running motor, every motion counting for construction rather than destruction.

Without health no man is in fit condition to withstand the onslaughts of business life; therefore assuming that the manager is the happy possessor of good health, then energy hinges on mental activity. Could we but make it a daily practice to figuratively look ourselves in the face and ask ourselves how much of the day has gone by while the juice was turned off of our brain, we would all soon discover that a greater amount of mind action would rest rather than tire our "think-boxes" and result in enhancing physical energy, which is but the galvanic activity of a constantly working mentality.

The man of energy is seeking for no amelioration in his work. He realizes that his life is only what he himself makes it and that no task is hard unless he sees fit to admit its difficulty. He wastes no time in crying over spilt milk but, if errors of judgment have crept in, he is quick to see, to rectify and to seek new fields for his effort. What might seem insurmountable obstacles are to this man but stepping stones toward greater achievements. There is so much to be said on this, I have taken the liberty of writing the following Biblical paraphrase.

Though I work with judgment and brains and have not energy I am become as a lazy loafer or a dreaming idler. And though I have the gift of analyzing and understand all

technicalities and all prices and though I have all integrity so that even my competitors trust me and have not energy, I am nothing. And though I bestow all my time to my business and though I give the boy orders to bring my lunch to the office and have not energy, it profiteth me nothing. Energy worketh incessantly and is effective. Energy demolisheth not; energy patteth not itself on the back, is not self satisfied. Doth not worry over trifles, seeketh not ways and means, is not easily exhausted, thinketh no troubles. Rejoiceth not in getting the better of a competitor, but rejoiceth in everybody's prosperity. Forceth all things, impresseth all things, moveth all things, pulleth all strings. Energy never faileth; but whether there be good judgment, it might fail; whether there be brains, they might not know; whether there be influence, it might vanish away. When I was a clerk, I spoke as a clerk, I understood as a clerk, I thought as a clerk; but when I became a manager I put away eye-shade and bill-book. And now abideth judgment, brains, energy, these three; but not the least of these is energy.

Next comes imagination. Old Isaiah wrote "Without the vision the people perish." I believe there is somewhat of a misconception as to what imagination signifies, it is so easily confounded with fancy. Imagination is the mental power which enables us to combine the products of knowledge in new forms, while fancy is but a superficial faculty which flits about the surface of things. A manager to be successful must be able to look ahead; to "take a notion," to plan with a big degree of accuracy for the future. He must be able to feel the public pulse, to detect the underlying sentiment of the country and "put his house in order" to meet changing conditions. We see lots of good fellows who are narrow minded, who are unable to look beyond the day's work—they need imagination, they need the ability to "take a notion."

Imagination backed up by that most necessary personal quality of courage is what enables a man to break away from tradition—to do differently what has always been done; to do what has never been done before.

Imagination tends to make a man more liberal minded, more public spirited, it helps him to look at things from other view points than his own.

And last of all for our sixth qualification I would speak of sobriety. There is no man really successful who "Sees through a glass darkly." Show me a single man who can keep his faculties, well balanced and properly controlled, with a lot of booze aboard. And the public is learning more and more to distrust such men. Proportionately there is not half the drinking among business men today as could have been found twenty-five years ago. It is bad for business and bad for the fellow.

A manager's staff, his heads of departments, are bound to reflect the vices or virtues, the character, methods and ideals of their chief, and they in turn are exemplifying, in their various departments, and in their relationship and cooperation with one another, fundamental principles of efficiency which are based very largely on the example set.

To sum up all that I have been elaborating in this article, I believe that if any commercial enterprise is a conspicuous success it is because of the personality of its manager; because he has gathered about him and developed men of his own courageous, stable, dependable qualities, and because he and they have built up an organization in which every unit is properly selected, carefully assigned and intelligently and considerately managed, so that the application of the principles of efficiency, which are but natural laws of success, is instinctive.

And now after all has been said; after we have endeavored to name and justify the six essential requisites of the manager, there are, no doubt those who, hearing, are tempted to ask where such a superman is to be found.

My reply is that some of us possess some of the qualifications and some of us a little of them all, and all of us, if we so choose, can make it the business of our lives to fit these things, so necessary to our success, into our characters. In closing let me modify a quotation from Henry Drummond. "Is life not full of opportunities? Every man, every day has a thousand of these opportunities. The world is not a playground; it is a school-room; Life, no holiday, but an education, and the one eternal lesson for us all is, how better can we do our work."

ELECTRICAL DEVELOPMENT AND JOVIAN LEAGUE OF SAN FRANCISCO.

The first meeting of the Electrical Development and Jovian League of San Francisco since the summer recess will be held on Tuesday, September 2, when Robert Newton Lynch, executive head of the Chamber of Commerce and of the California Development Board, will address the members. A large and representative attendance is already assured, and a profitable session is promised to all who attend.

W. S. Berry, as president of the League, has received an invitation to be present at a meeting of the presidents of similar societies and the manufacturing companies to be held at Association Island, New York, September 3d to 6th, in connection with the plans of the Society for Electrical Development, to which J. Robert Crouse has added a contribution of $10,000 to the $130,000 already raised toward the initial $200,000 subscription.

Association Island Meeting, September 3 to 6, 1913—Program.
Mr. J. B. McCall, Chairman.

Afternoon Session, September 4, 1913.

1. "Government in Relation to Business," Wm. D. McHugh, Omaha, Neb.
2. "Distribution of Electric Energy—Present and Future," Samuel Insull, president Commonwealth-Edison Company, Chicago, Ill.

Evening Session, September 4, 1913.

3. "Future Technical Development in the Electrical Business," Dr. Chas. P. Steinmetz, General Electric Company, Schnectady, N. Y.
4. "State Commission Control," chairman or some member of State Commissions of Massachusetts, New York or Wisconsin.

Afternoon Session, September 6, 1913.

5. "Society for Electrical Development," Henry L. Doherty, president H. L. Doherty & Co., New York City.
6. "Principles of Resale Control," F. P. Fish, Boston, Mass.

Evening Session, September 6, 1913.

7. "Financial Outlook," Frank Vanderlip, president National City Bank, New York City.
8. "Favorable Condition for Labor," Dr. Thomas Darlington, secretary Welfare Committee, Iron & Steel Institute.
9. Presidential addresses, J. B. McCall, president National Electric Light Association; C. E. Scribner, vice-president American Institute of Electrical Engineers; Preston Miller, president Illuminating Engineering Society; S. O. Richardson Jr., president Manufacturers' Club; Franklin Overbagh, secretary Electrical Supply Jobbers' Association; Ernest Freeman, president National Electrical Contractors' Association; F. E. Watts, Jupiter of Jovian Order.
10. Thomas A. Edison, guest.

JOURNAL OF ELECTRICITY
POWER AND GAS

PUBLISHED WEEKLY BY THE

Technical Publishing Company

Rialto Building, San Francisco

E. B. STRONG, President and General Manager
A. H. HALLORAN, V. P. and Managing Editor
ROBERT SIBLEY, Treasurer and Editor in Chief
C. L. CORY, Secretary and Special Contributor
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On Library Cars of all Southern Pacific Trains.

TERMS OF SUBSCRIPTION

United States, Cuba and Mexico	per year,	$2.50
Dominion of Canada	" "	3.50
Other Foreign Countries within the Postal Union	" "	5.00
Single Copies, Current Month	each	.25

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Entered as second-class matter at the San Francisco Post Office as "The Electrical Journal," July, 1895.

Entry changed to "The Journal of Electricity," September, 1895.

Entry changed to "The Journal of Electricity, Power and Gas," August 15, 1896.

Entry changed May 1, 1906, to "The Journal of Electricity, Power and Gas," Weekly.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Political versus Private Operation

By a vote of four to one, the people of San Francisco have decided to assume a bonded indebtedness of three and a half million dollars in order to build sixteen and a half miles of municipally-owned electric railway. The immediate results of this action should be most beneficial. Adequate transportation will be secured to the grounds of the Panama-Pacific International Exposition, as well as to certain sections hitherto denied needed service because of the impossible franchise restrictions imposed by the city charter, and the city will be enabled to enjoy a normal growth in population which must invariably be preceded by transit facilities.

But the ultimate method of operating these lines is a question of deep concern to the people of San Francisco, who well know the inefficiency, and worse, of the average municipal employee. While the present Mayor is admirably qualified to superintend the construction, there is no guarantee that future administrations will be any better than some of those in the past. Political operation of municipally-owned public utilities is capable of far greater abuses than have ever been revealed in private operation of privately-owned utilities. The far-sighted man looks to ultimate results, not immediate benefits. Municipal ownership of any utility discourages private investment in other utilities and thus eventually retards the growth of the city.

This journal in the past has consistently advocated municipal ownership under private operation as an ideal susceptible of practical accomplishment, whereas political operation could be successful only in Utopia. This first step toward accomplishing this ideal has been taken; we earnestly suggest that the second step be private and not political operation.

Better Estimating Methods

A movement has been launched by a number of architects, engineers and contractors to form a new society to be known as the American Institute of Quantity Surveyors. The purpose is to develop better methods of estimating and dealing with bids, substituting certainty for the present gambler's chance that many bidders take. While this organization is of interest chiefly to the building trades it has valuable suggestions for those in the electrical business who could profitably adopt some of the plans proposed.

In the past there has been too much "guestimating," too little judgment and not enough co-operation among bidders. A quantity surveyor is one who is qualified by experience to standardize the quantities upon which all contractors will be called to bid, thus reducing it to a science, which is merely organized knowledge. If each contractor is furnished with an accurate bill of quantities, a schedule containing itemized quantities of all materials and labor entering into the contract, he can make an intelligent bid, fair alike to himself and to the owner. Thus will the industry benefit from this commendable undertaking for which G. Alexander Wright of San Francisco is sponsor. Waste in bidding is due to ignorance of cost, efficiency to knowledge.

Selling to the Ultimate Consumer

Selling electrical appliances, as distinguished from the older lines of business, is handicapped by the lack of an adequate retail outlet. The manufacturer, by means of better machinery, methods and men, has reduced the cost of his output again and again, so that his end of the business has been developed to such a high state of perfection that the next improvement in efficiency must come from the distributing side. When one-sixth of the cost of an article is due to the cost of selling it, the ultimate consumer, "from whom all blessings flow," has good reason for complaint. While such a state of affairs is naturally to be expected in any new business, the sooner it is corrected the more quickly will the business assume a stable and normal condition. What with low profits and high operating expenses, anything which tends towards simplicity and economy in methods of conducting business should be welcomed by the seller, who will then be enabled to give the buyer better service in the way of quality and delivery.

For example, the complicated system of multiple discounts now in force would be farcial if not so serious. The basic fifty per cent discount from list is a joke which in no way tends to create confidence in the mind of the buyer. Then the additional tens and fives and twos and ones, ad infinitum and ad nauseam, make an unnecessary tax on the mathematical faculties of both buyer and seller and invariably result in needless confusion. A company recently entering the electrical field has superseded this practice by employing a discount of but two figures, a method which should give a certainty and stability hitherto lacking in the business. This company also proposes to sell conduit on the same rational basis that any other kind of pipe is sold, the weight per hundred feet being the determining factor. Furthermore, the goods are handled too often; they are sold and re-sold, shipped and reshipped. Each time they are moved a new cost is added, which in no way adds to the value of the article to the consumer.

This is not intended as a brief for the mail order house or other means whereby the manufacturer sells direct to the consumer. The jobber is as necessary in the electrical business as is the clearing house in the banking business. These conditions are merely cited as examples where lost motion in the machinery of distribution wastes the power of selling.

Of far more immediate concern, is the subject which introduces this paper and from which we have slightly digressed, the lack of an adequate retail outlet. Reduced to its fundamentals, the matter is primarily a decision as to whether it is better to utilize existing machinery or to devise a new method of distribution. Can the great volume of electrical business which will finally be developed be carried in the present channels of some other business, or must a new channel be dredged for its exclusive use? Where should the layman be directed to buy his electrical appliances?

Various methods are now on trial. One enterprising manufacturer is availing himself of the drug store, using a heating pad, a milk warmer or vibrator as an entering wedge to induce the druggist to stock other devices. Others are enlisting the services of the grocery store, the initial step being a demonstration of electrically cooked food. Some are resorting to the department store, with its lure of bargain prices. A few sell direct through the mails by means of periodical advertising while many are employing the hardware store as the logical retail outlet. Others have fallen back upon the central stations, many of whom desire to control the character of current-consuming devices on their line. Finally there are a very few aggressive ones who are starting specialty shops selling only electrical equipment.

While the last named method is by all odds the most satisfactory, it is possible only in large cities. The secret of its success lies in its selection of trained salesmen. A thorough understanding of the action of electricity is as essential for the electrical merchant as is a knowledge of the action of drugs for a druggist. Certain precautions are necessary in using electrical appliances which can not be explained by the sales girl in a department store. So "where the goods are sold" is a minor importance to "by whom they are sold." The ordinary clerk in a pharmacy, grocery or hardware store is not fitted to sell electrical devices, though some clerk who has been properly trained can be trusted with such sales and furthermore can be counted on to make a far better showing on account of his specialized knowledge.

Electricity, like fire, is a good servant but a bad master. Few people realize the risk they run in using the improper fuses that the average hardware man might supply. No druggist is capable of advising as to what special switches are necessary to control heating devices or motors. A mere sales girl does not know that ordinary lamp cord should not be used instead of reinforced cord when a lamp is to be carried around or hung on a nail, nor does a grocery clerk know the danger of a paper lamp shade.

What is needed then to improve the efficiency of sales distribution is a school for retail salesmen of electrical goods who can go out and deal with the ultimate consumer just as the manufacturer's representative sells to the central station, jobber or contractor. The salesmen should be given a working knowledge of what electricity is in its practical sense, what is can do to lighten labor in home, farm and factory. He should understand the units in which it is measured and the relative amount required by different devices. This does not mean an engineering education, for an engineer is not a merchant who finds deep delight in dealing with the public, nor does he get the consumer's view point. Selling is the acme of endeavor in the industry, and yet it has not received a tithe of the attention which has been devoted to manufacturing. Here is indeed a work worthy of the efforts of some great organizatior such as the Society for Electrical Development.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

G. C. Harris, general manager of the Tulare Telephone Company, was at San Francisco this week.

F. N. Averill, manager Fobes Supply Company, Portland, made a business trip to Seattle last week.

P. E. Overend, sales specialist of the Northern Electric & Manufacturing Company, was recently in Victoria.

H. W. Reynolds of Chas. C. Moore & Co.'s San Francisco office, has returned from a flying trip to Pittsburgh, Pa.

W. Stranahan of the San Joaquin Light & Power Company at Fresno, spent his vacation in San Francisco during the past week.

Geo. Walton, manager for the California & Oregon Power Company, at Klamath Falls is making a several days' stay in San Francisco.

H. L. Jackman, manager of the Western States Gas & Electric Company, at Eureka, was a visitor in San Francisco during the past week.

K. A. Schaller of the railway and lighting division, Westinghouse Electric & Manufacturing Company's Seattle office, was in Portland recently.

Howard Joslyn, city electrician of Seattle, was elected fourth vice-president of the Municipal Electricians, at their recent Watertown, N. Y., convention.

P. F. Sise, managing director of the Northern Electric & Manufacturing Company of Montreal was recently in Vancouver, while on his annual inspection trip.

R. S. Hunkins in charge of the electrical department, Fairbanks, Morse & Company's Seattle office was in Mabton, Washington, last week on company business.

Mr. Stewart, local manager of the Mt. Whitney Light & Power Company at Porterville, Cal., spent the major portion of last week on a vacation visit to San Francisco.

Arthur Kempston, assistant chief of the Department of Electricity, San Francisco, returned to the city during the week after a wedding trip which embraced the southern part of the state.

G. D. Jones, electrical engineer of the Department of Engineering, Sacramento, visited San Francisco during the past week enroute to Los Angeles, where he is looking into some state installations.

Jesse W. Lilienthal has been chosen by the stockholders of the United Railroads of San Francisco as president, to succeed **Patrick Calhoun,** and has been given the proxies to name the entire directorate.

A. E. Garland, special factory representative electrical department, Fairbanks, Morse & Company, with headquarters in Chicago, is in Seattle on special work. He will visit the various houses of the company on the coast before returning to Chicago.

W. S. Berry, sales manager for the Western Electric Company, San Francisco, left last Tuesday for an extended trip East, visiting the Grand Canyon, Chicago and New York while away. He will also be an attendant at the Jobbers' convention at Buffalo, September 9 to 11.

J. P. Davidson, formerly representative for the W. F. Boardman Company, of San Francisco, has resigned to accept a position with the Pacific Coast office of the General Gas Light Company at San Francisco. Mr. Davidson will cover the territory of California, Arizona and Nevada.

Henry F. Holland, western representative for the Simplex Electric Heating Company, has returned to Salt Lake City after a trip over his territory extending over a period of a month. Mr. Holland reports trade conditions good and especially a rapidly increasing demand for electric ranges.

F. H. Wright of Covina, Cal., was at San Francisco last week, where he appeared before the State Railroad Commission in support of a bond issue recently applied for by the Covina Telephone Company. The bond issue which was authorized by the commission provides for extensions in this company's system. Mr. Wright is general manager of the company.

A. E. Griswold of the A. G. Electric & Manufacturing Company of Seattle, has been at San Francisco for the past two weeks looking over the field in reference to starting an agency for his Seattle house. He is carrying a good line of switchboard apparatus and comes highly recommended. Mr. and Mrs. Griswold came from Seattle in their machine and expect to take in San Diego and Los Angeles before returning home.

C. B. Hawley, president and general manager of the Intermountain Electric Company, left Friday on an Eastern trip, accompanied by his wife and daughter. While away they will visit Denver, Boston, New York, Washington, Detroit, Chicago and Niagara Falls. At the latter point he will attend the Jobbers' Convention, September 9th, 10th and 11th.. He will represent the Utah Electric Club at the convention of Associated Electric Clubs in New York, September 6th.

Geo. Duffield, for the past three years special representative of the National Electrical Contractors, has been selected by the executive board to fill the unexpired term of **W. H. Morton,** the National Secretary. Mr. Morton has filled the position as secretary for the past thirteen years, ever since the organization was started, and it is with a great deal of regret that the contractors throughout the United States are giving him up. He has formed a company at Porto Rico for the development of pine apple and grape fruit land.

OBITUARY.

Matthew Maury Corbin, special agent for the General Electric Company at San Francisco, Cal., died at Charleston, West Virginia, on August 24th, from an attack of pneumonia after an illness of three days. Mr. Corbin has been connected with the General Electric Company for the past fifteen years, representing them in their railway traction department. He had been with the San Francisco office for two years and was shortly to be transferred to Philadelphia. His work brought him into contact with many persons who soon became his friends and who greatly deplore his death. Mr. Corbin was born at Lexington, Virginia, thirty-nine years ago and was graduated from Virginia Military Institute. He was an associate member of the American Institute of Electrical Engineers and a member of the Engineers' Club of New York and San Francisco. Funeral services were conducted in Charleston and the body was taken to Lexington. The deceased leaves a wife and two children, who were at Berkeley at the time of his death.

PACIFIC COAST GAS ASSOCIATION.

The 21st annual convention of the Pacific Coast Gas Association will be in session at San Jose, California, September 16th, 17th and 18th, 1913, and will be presided over by Mr. C. S. Vance of Los Angeles, Cal., and at which meeting the following papers will be presented.

President's address ..... C. S. Vance
1. Oil Gas ..... Leon B. Jones
2. Industrial Uses of Gas ..... John B. Rodd
3. Rate Making ..... Dr. A. C. Humphreys
4. Modern Gas Distribution and Part Played by Automobile ..... D. E. Kepplemann
5. Gas Street Lamps ..... C. S. Babcock
6. Gas Company's Public Policy ..... L. A. Wright
7. Standards of Quality and Service for Oil Gas.. H. M. Papst
8. Wrinkles ..... H. W. Burkhart
9. Experiences ..... John Clements
10. Novelties ..... H. P. Pitts

Everything points toward a goodly attendance upon the convention. The annual banquet of the association will be held at the Hotel Vendome on Wednesday evening, September 17th; and on Thursday the members and their families in attendance upon the convention will, as guests of the San Jose District of the Pacific Gas & Electric Company, be entertained with a trolley trip through the beautiful Santa Clara Valley to the famous Alum Rock Park where luncheon will be served, and after which dancing and other amusements can be indulged in by the members and their families.

BOARD OF DIRECTORS FOR CALIFORNIA STATE CONTRACTORS' ASSOCIATION.

C. V. Schneider of Sacramento, president of the California State Association of Electrical Contractors has appointed the following board of directors to assist him in state work during the coming year: N. Hope, San Francisco; J. C. Rendler, Los Angeles; C. Heilbron, San Diego; Geo. King, Oakland; H. Miller, Pasadena; J. S. Reynolds, Santa Barbara; L. Youdell, Stockton; F. Somers, San Jose; E. F. Burkhart, Palo Alto; C. Goodwin Frankish, Pomona; E. H. Hann, Riverside; M. Phillips, Ventura; J. Endert, Bakersfield; W. D. Thomas, Marin and Sonoma counties.

UTAH LIGHT & RAILWAY COMPANY OUTING.

The third annual outing of the employes of the Utah Light & Railway Company was held at Wandamere Saturday, August 16th, and all company business was suspended at 11 o'clock in order that employes might prepare for the occasion. Free transportation to the park and free tickets of admission was provided by the company. About 500 employes with their families took advantage of the outing offered.

The first event—a baseball game between the Light & Power and the Railway Department was won handily by the electric light nine by a score of 16 to 9. The railway men were unable to integrate the sine, flat top, peak top and spiral curves of Pitcher Hall of the meter department. The winners of the other events follow: 100 yard dash, Elmer Redfern, of the Line and Service Department; Ladies' Peanut Race, Mrs. Wilson of the Shops Department; Ladies' 50 yard Dash, Miss Johnson of the Line and Service Department; Relay race for heads of department with one assistant, C. H. Jenkins and Elmer Redfern of the Line and Service Department; Pole Climbing, John Hiseman of the Line Department; Rope Throwing, S. J. Swyers of the Line Department; Pie-eating, Fred Hartley of the Shops Department. The tug-of-war between the Shopmen and the Line Department was was won by the shopmen.

Henry Dunbar, of the Line and Service Department, was there as usual, and provided a continuous performance of amusement for the children and grown-ups with his funny makeups and antics. He entered the ladies' 50-yard dash and finished first in the event, but was disqualified by the judges due to the fact that his slit skirt exceeded the limits prescribed by the rules. He also entered the pie-eating contest, but lost because he said the pie was too good to bolt it as the rest of the fellows were doing.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

A decision has been rendered authorizing the Tulare County Power Company to issue ten promissory notes in the aggregate face value of $50,000, secured by $66,500 of bonds, to replace similar notes held by Thomas C. Job. The commission denied the application to pledge $4000 of bonds to secure $3243 interest on notes held by Mr. Job.

The Great Western Power Company has applied for a modification of the Commission's order granting authority to issue bonds of the value of $4,411,000.

A decision was rendered denying the request of the Oro Electric Corporation for a rehearing of the application for permission to serve certain portions of San Joaquin County and the city of Stockton.

A decision was rendered authorizing the Oakland, Antioch & Eastern Railway Company to issue $1,000,000 of bonds. The proceeds will be devoted to constructing a line of railway from Bay Point to Sacramento.

Authority was granted to the Delano-Linns Valley Telephone Company, to issue $250 of stock, and to extend its system in Kern county.

The Oakland, Antioch & Eastern Railway Company was granted authority to purchase from the Northern Electric Railway Company, one-half interest in certain tracks in Sacramento, for the sum of $11,403.

A decision was rendered authorizing the Home Telephone Company of Covina to issue $90,000 of bonds for the purpose of discharging indebtedness and making improvements.

TRADE NOTES.

The Fort Wayne Electric Works of the General Electric Company have sold 1200 meters to the city of Seattle.

The Northern Electric & Manufacturing Company has opened a branch office in Victoria, B. C. Mr. A. C. Routh is in charge.

A. Forsyth, proprietor of the Forsyth Electric Company, Seattle, announces the sale of 40 motors this month ranging from ½ to 40 h.p.

Davis & Hull, Tacoma, have been awarded the contract for installing 10 additional motors in the new furniture factory of F. S. Harmon & Company in that city.

Evans-Dickson Company, Tacoma have been awarded the contract for installing electrical equipment in the Swiss society hall and is also drawing plans for a small concrete dam for a hydroelectric unit to be installed at Morton, Washington.

The General Electric Construction Company, San Francisco, has been awarded the contract for wiring the building at Fourth and Jessie streets, for Mary Phelan, for the sum of $3600. The same firm has also been awarded the contract for wiring the garage at Van Ness and Geary street for the sum of $3300.

The Canadian General Electric Company has been awarded a contract to furnish a generator for the West Kootenay Power & Lighting Company of Rossland, B. C., part of a 7500 k.v.a. installation of a water-wheel driven generator. The water-wheel contract went to the Canadian Allis-Chalmers Company. It is understood that the increase in the generating capacity of the West Kootenay Power & Lighting Company has been undertaken in anticipation of the Canadian Pacific Railway Company electrification between Rossland and Castlegar. The contract for the electrification of this section was awarded a short time ago to the Canadian General Electric Company.

The Central Electric Company has been awarded the decorating work for the Portola Festival for about $20,000. This decoration will be different from any yet seen in San Francisco. Instead of having lights festooned across the street, 100 25 watt Mazda lamps will be festooned around each trolley pole and a large plaster of paris basket filled with flowers will give a most beautiful effect. At Third and Market streets a large bell with different colored lights will be hung. The lamps connected in such a manner as to have the bell continually rotating. At Union Square a large electric fountain will be installed. Festoons will be hung at the intersection of the streets throughout the downtown district. It will probably be the first decoration of any large size to be entirely equipped with Mazda lamps; about 30,000 25 and 40 watt lamps being used.

THE ELECTRICAL CONTRACTORS' DEPARTMENT

REQUIREMENTS FOR ELECTRIC LIGHT AND POWER SERVICE AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

The Division of Works of the Panama-Pacific International Exposition to be held at San Francisco in 1915 is gratuitously distributing a handbook of rules and regulations from which the following is taken:

The Exposition Company will install a system of mains for the distribution of electric light and power to all buildings and structures on the exposition grounds and will supply the following kinds of service:

In the exposition buildings the lighting will be served from 60-cycle, three-phase mains having a voltage of approximately 115 between conductors. The lighting elsewhere will be served from 60-cycle, single-phase, 3-wire mains having a voltage of approximately 115 to neutral and 230 between outside conductors. Before ordering lamps consumers should ascertain from the electrical department the exact voltage at which current will be delivered to their service wires.

In the exposition buildings there will be available for power purposes 60-cycle, single-phase and three-phase current at an approximate voltage of 230. The power service elsewhere will be three-phase at 230 volts and single-phase at 230 volts and 115 volts. Single-phase motors must not be over 1 h.p. in size if served at 115 volts nor over 5 h.p. if served at 230 volts.

Direct current at approximately 125 and 250 volts will be available in the Machinery, Mining, Transportation and Manufactures Buildings only. Direct current will only be available during the hours that the exposition buildings are open to the public, and will be supplied for only such purposes as absolutely require the use of direct current. No direct current will be furnished for motors or apparatus of larger capacity than 25 h.p. and no motor larger than 2 h.p. will be served with 125 d.c., unless arranged for in advance under special contract.

All buildings or structures erected by or for participants in which electric service is desired, or required by the director of works, shall have installed and connected to the exposition's mains, by and at the expense of the owner or occupant, such electric wiring as is required by the director of works. All drawings, plans and specifications for electric wiring to be installed by or for participants, shall be submitted to and approved by the director of works and done under his direction, as hereinbefore outlined. All lamps, motors, and appliances shall be shown in the plans with their rated capacity indicated.

Application for an electrical construction permit shall be filed with the director of works in writing on the printed form furnished, together with plans and specifications in duplicate, describing the proposed wiring, apparatus or fixtures. Construction charges are as follows and shall be paid by the participant's contractor:

The charge for each permit granted will be $2.00, payable when permit is issued.

Inspection of all electrical construction and apparatus will be made by authorized representatives of the division of works, and the fee for inspection will be as follows, and shall be paid when final certificate of inspection is issued:

1. For lamps, heating appliances and all apparatus or devices, except motors and generators, $1.00 per kw. of connected load.

2. For motors and generators—

1 kw. and under, 50c each.

Over 1 kw. and up to 15 kw., $1.00 each.

15 kw. and over, $2.00 each.

Minimum fee for any inspection, $1.00.

When more than two inspectors of any installation or part thereof are necessary, additional fees will be charged at the rate of 75c per hour for the time required by the inspector to make additional inspection.

For consumers located in the exposition buildings, concessions district or other location where the mains are not underground, the charge for furnishing and installing meter, making connections within the consumer's service cabinet and connecting the consumer's service wires to the exposition mains, will be $15.00 for each service. For flat rate consumers, the charge for making connection within the consumer's service cabinet and to the exposition's mains will be $5.00 per service. These charges are payable when permit is issued. For consumers served from the exposition's underground system, the charge for furnishing and installing meter, making connection within the consumer's service box and connecting the consumer's cable to the exposition's underground system will be $25.00, payable when the permit is issued. For flat-rate consumers the charge for connecting the consumer's cable to the exposition's underground mains will be $15.00, payable when permit is issued.

The owner or consumer shall at his own expense run service wires from his service cabinet to the exposition's mains at the point designated in his permit and install all wiring, conduits, switches and other appurtenances required for the service, complete and ready for final connection to the exposition's mains. All work done and all material used shall be subject to the inspection and approval of the director of works or his authorized representative.

Actual connection to the exposition's mains and connections within the service cabinets shall be made only by the exposition. If underground, the service leads shall not be covered up until passed by an authorized electrical inspector.

All electrical wiring done by consumers shall comply in every respect with the "Rules and Requirements" of the National Board of Fire Underwriters in force at the time the work is done; with the requirements herein and with such additional rules and requirements as may be made by the exposition. In case of dispute as to the interpretation of rules and requirements, or as to approval of work or materials, the decision of an authorized representative of the Board of Fire Underwriters of the Pacific shall be final.

The consumer shall install, where directed, a service cabinet of design and construction approved by the director of works, and install therein service fuses of the capacity and type designated in his permit. The consumer shall run his service wires from the point designated in his permit to his service cabinet in conduits or use armored cable. The consumer shall install on his distribution board a main service switch with suitable fuses and run his wires, therefrom into the said service cabinet, leaving sufficient spare lengths to enable the exposition to make the necessary connections within the service cabinet.

Service cabinets for consumers purchasing energy through a meter may be made to enclose the fuses, meters and accessories, or the service fuses may be placed in a box separate from the meter and accessories, in which case a metal covering for the connection between the fuse box and meter box shall be provided. In all forms of construction the arrangement must be such that the fuses and meter box can be separately sealed, and the meter read without breaking the meter box seal. The consumer shall provide sufficient space and fastening within the service or meter box for the exposition meter and accessories and shall bring all necessary wiring into the box.

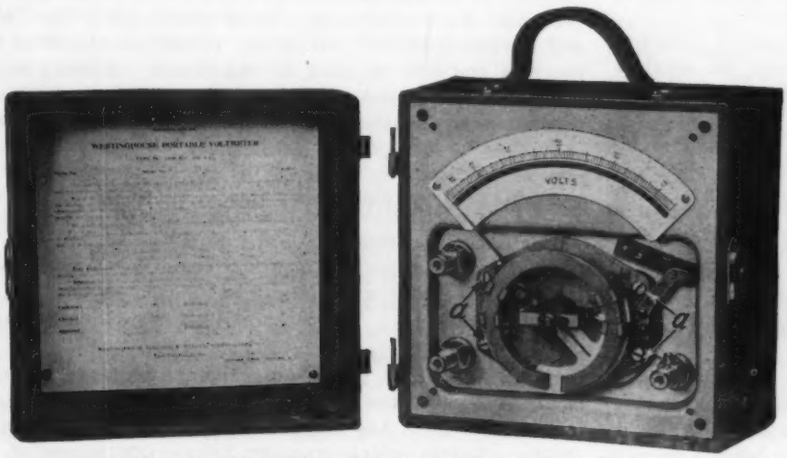
(To be continued.)

INDUSTRIAL

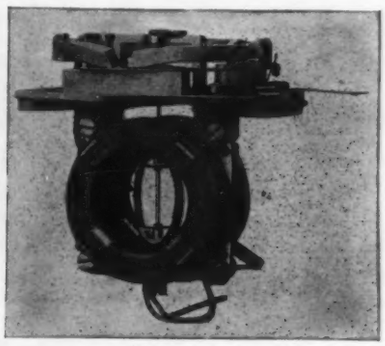
PORTABLE A.C.—D.C. METERS.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has just introduced a line of high grade direct-reading instruments for general testing and laboratory work where especially high accuracy is desired, particularly on alternating current. The type PC volt-meters and watt-meters operate on the moving coil principle. The perfectly damped character of the indications enables readings to be taken quickly and accurately, and makes these meters very desirable in measuring fluctuating loads.

The fundamental advantages of moving coil meters are the high accuracy attainable and the fact that they can be used on either direct or alternating current circuits.



Damping Mechanism Exposed by Removal of Face Plate.



Bottom View, Showing Electrodynamometer Coils.

The movement is mounted as a unit and can be removed complete after taking off the face-plate, which makes a dust-proof joint with an inner aluminum mounting plate. The meters have a laminated iron shield riveted to the aluminum mounting plate, protecting the movement both from dust and from stray magnetic fields. The weight of the moving element is in all cases low, preserving the pivot jewels from wear, and the torque is relatively high. The pointer is of U

Back View, Showing Resistance and Iron Shield.

section, to secure great strength with minimum weight. The moving element is not light enough to be delicate, yet not heavy enough to injure the jewels during shipment, or to produce wear in use. The weight of the moving element is less than 5 grams.

The meters attain their highest accuracy on alternating current, and are free from temperature, frequency and wave shape errors. On direct current, the meter may be subject to slight errors due to residual magnetism of the laminated iron shield, but this can be entirely eliminated by taking the average of reversed readings.

A contact switch operated by a button on the front of the instrument is provided on each voltmeter. The voltmeters are entirely self-contained, all necessary resistors to obtain the calibrated scale readings being contained in the case, which is well ventilated.

The wattmeters are also entirely self-contained, all resistors necessary for the rated voltage ranges being contained in the case. The wattmeters that have double current or double voltage range are provided with a switch operated by a knob on the face-plate, which makes the proper series or series-parallel connection of coils when the knob is turned to the proper position. Only two current and two voltage binding posts are, therefore, necessary.

NEW CATALOGUES.

Handbook FL from the Electric Storage Battery Company is concerned with "Hyray" Batteries for Low Voltage Isolated Electric Plants, giving prices and capacities.

Chicago Pneumatic Tool Company is distributing Bulletin E-39 on Duntley Portable Electric Grinders for heavy duty. Bulletin 34B deals with Chicago Pneumatic Driven Compressors.

Small Motors No. 16 issued by the Industrial & Power Department of the Westinghouse Electric & Manufacturing Company has just made its appearance. This issue is devoted to the subject of electric motor driven washing machines. Electrical Equipments for Automobiles and Garages is the title of a small pamphlet (folder 4223) issued by the company to describe the Westinghouse 6-volt, single wire, starting, lighting and ignition systems developed by that company. Westinghouse Three-Inch Meters is the title of a little pamphlet (4254) describing the different meters having an overall dimension as indicated in the title. These meters are adapted for automobile battery equipments. Type CS Squirrel Cage Induction Motors for constant speed service are fully described and illustrated in descriptive leaflet No. 2321.

NEWS NOTES

INCORPORATIONS.

GLENDIVE, MONT.—The Pioneer Telephone Company has been incorporated for $40,000 to build lines in Dawson county.

SALEM, ORE.—The West Stayton Power & Railway Company has been incorporated for $100,000 by S. N. Arnold, E. D. Stedler and Grant Thomas.

ILLUMINATION.

IDAHO FALLS, IDAHO.—An addition of two 750 horsepower units is being planned for the city plant here.

PLACENTIA, CAL.—An election will be held September 10th for the purpose of determining the question of the formation of Placentia Lighting District of Orange county.

VANCOUVER, B. C.—Point Grey, a municipality suburban to Vancouver, has appropriated $500 to secure the services of an engineer to report on the cost of a municipal lighting plant.

SAN FRANCISCO, CAL.—Rousseau & Rousseau, architects, will receive bids until September 10 for the electrical installations in the Portola Realty Company's $90,000 apartment house.

TACOMA, WASH.—Bids will be called for in a few days by the Evans-Dickson Company, electrical engineers, for a hydroelectric plant for the town of Eatonville. At a recent election the voters authorized $12,000 in bonds to pay for the system.

LARAMIE, WYO.—L. L. Nunn of New York, who was formerly president and general manager of the Telluride Power Company before its sale to the Utah Power & Light Company, has applied to the Caspar town council for an electric lighting franchise, and proposes to install a plant sufficiently large to supply an electric street railway system.

JEROME, ARIZ.—Upper Verde Utilities Company has made application to the corporation commission for a certificate of convenience, and for permission to issue $130,000 worth of stock, to raise funds for furtherance of its work. The company is headed by officials of Clark interests in this district. The company will take over the water and light systems in Jerome and Clarkdale, and will install sewer system in both cities.

SAN DIEGO, CAL.—Plans for illumination of almost the entire business section of the city by ornamental cluster of lights have been completed in the city engineer's office. Five-light cluster lamps will be installed from State to Sixteenth street, on H street, at a probable cost of $19,000. From Columbia to Ninth street, same style lamps will be installed, at a cost of $11,500. The city engineers' office has called for bids for the installation of these lights.

EPHRAIM, UTAH.—A the last meeting of the city council it was decided to grant the request of the citizens for an all-day electric power service, and hereafter consumers will have this advantage. It was found that so many customers were using electric motors on washing machines and other equipment, and electric irons, fans, and similar appliances, that they could no longer be denied the convenience of their use whenever necessity required.

OGDEN, UTAH.—A proposition to extend the "White Way" lighting on a limited scale from Adams avenue to Harrison avenue on Twenty-fifth street, and on Jefferson avenue from Twenty-fifth to Twenty-seventh street, is being discussed, and President Rowe of the Weber Club expects to have the proposition in such a shape within a few days that it can be submitted to the city commission for consideration. The plans for the construction of the extended lighting system are similar to those under which the present white way lighting was installed. The city, the Ogden Rapid Transit Company, and the Utah Power & Light Company will stand the greater part of the expense. A small sum must be contributed by the property holders on the streets lighted.

MARICOPA, CAL.—What is to be a large gas compressor and pumping plant has been started by the Midway Gas Company on property recently acquired by it about one mile east of Signa Station. The plant will contain all of the latest model compressors and pumping machinery for putting a pressure on its main gas lines to Los Angeles. The excavations for the first engine room has been nearly completed. This will be filled to the level of the earth with concrete to form a foundation for the heavy pumps and compressors. Another is to be started within a few days which will be 400x50 ft. and 4 ft. deep. It will also be filled with concrete and will be used for machinery. A large cooling pond will be dug and the walls and bottom will be made of cement. The plant will cost over $700,000 when completed.

TRANSMISSION.

LA PINE, ORE.—Word has been received from the Pringle Falls Electric Power & Water Company in Portland that within 30 days a force of men will begin development work. It is expected that within the next 18 months the falls will be fully developed. The power site is six miles northwest of La Pine.

LOS ANGELES, CAL.—An ordinance adopted by the city council, approves the resolution of the board of public service commission of Los Angeles, providing for the sale of the surplus electric power produced by electric plants of said city, and not required for use in the city limits, to consumers in the county of Inyo, and fixing rates to be charged therefor.

GRASS VALLEY, CAL.—Arrangements are being made to build an electric plant for furnishing power for the Birchville mine near Graniteville. It is proposed to construct a modern power plant, which will be adequate for running the Birchville on an as extensive scale as may be desired and the new proposition will mean much to the Graniteville district.

SEATTLE, WASH.—J. D. Ross, superintendent of the Seattle city lighting department has taken the stand that the city of Seattle should build a transmission line between Seattle and Tacoma to connect with the municipal power plant of that city at an approximate cost of $100,000. This would enable the city to purchase enough electricity from Tacoma to enter into more active competition with the Puget Sound Traction, Light & Power Company.

LAKE TAHOE, CAL.—After more than three years' litigation in the courts of California and Nevada, work has commenced again upon the big dam of the Truckee River General Electric Company, where the Truckee River emerges from Lake Tahoe. Most of the legal difficulties have been overcome. A large force of men started work upon the uncompleted dam last week. Double shifts are being worked, and it is expected that the dam will be completed before winter. Work on the structure was commenced in 1909, and when the work was half completed objection was made to further construction on the ground that the dam would reduce the surface of the lake over six feet. It has now been proven that the dam will not affect the lake level. The work is being resumed by the Stone & Webster Construction Company. The dam is 30 ft. high with a width of 250 ft., and is of the gravity sectional concrete type.

BURNEY FALLS, CAL.—A project for the development of the northern parts of Shasta, Modoc and Lassen counties was presented before Commissioner Loveland at the hearing of the application of the Pitt River Power Company for permission to operate a power system from an installation at Burney Falls. The company contemplates building a plant to generate 1000 h.p., subsequently to be expanded into a larger system. An application to issue 1325 shares of preferred stock to finance the construction was deferred until the company's charter, which provides only for common stock, can be amended. The directorate comprises Dr. Wm. F. Blake, ex-Governor W. T. Jeter, Judge J. H. Logan and John F. Sheehan Jr. Commissioner Loveland also heard the application of E. M. Wilson, Nettie B. Harris and Lawrence A. Wilson for a certificate to operate a small power plant in a portion of Modoc county covered by the Pitt River application.

TRANSPORTATION.

REDONDO BEACH, CAL.—A franchise for wharf No. 1 has been sold to the Pacific Electric Railway Company by the city council.

SEATTLE, WASH.—General Manager L. H. Bean states that the installation of a $60,000 electric block system on the line of the Puget Sound Electric Railway between Seattle and Tacoma is to be started at once. Elimination of all rough places in the track will also be started at the same time.

LOS ANGELES, CAL.—Seeking to prevent the Los Angeles Railway Company from building a car barn on West Washington street, citizens residing west of Main street, between Sixteenth and 24th streets, have organized the West Washington Street Improvement Association to fight the proposed plan.

SAN FRANCISCO, CAL.—Interest on the $1,100,000 note issue of the Oakland Terminal Railway Company, secured by trust deed to tide lands formerly owned by the Key Route, has been paid by the San Francisco-Oakland Terminal Company, which, as the holding company, guaranteed the note issue. An extension of one year was asked and will probably be granted for the payment of principal.

SEATTLE, WASH.—The receivers for the Seattle, Renton & Southern Railway Company, a line nine miles long partly within and partly without the city limits of Seattle have rejected the offer of the city to purchase the entire line for $1,200,000 for the reason that the attempt on the part of the city to take over that part of the road beyond its limits would be illegal and because the sum offered is not adequate.

PHOENIX, ARIZ.—City Attorney Prescott has reported to the council that under the franchise granted the Phoenix Railway Company the council could require them either to pave their tracks on Second avenue or to remove their tracks off the street, and that in case the company refused to do either, the city could declare the franchise void for a noncompliance with part of it, and proceed to remove the tracks from the streets. The city council will meet this week to consider the matter further, and it is quite likely that an amicable settlement will be concluded.

SAN JOSE, CAL.—F. E. Chapin, vice-president and general manager of the Peninsular railway, with headquarters in San Jose, has been in conference with Paul Shoup, in charge of electric interurban service for the Southern Pacific relative to Peninsular service between Los Gatos and San Francisco. It is planned to operate trolley cars over the Southern Pacific tracks between Los Gatos and Palo Alto and to give a direct night service to San Francisco, beginning about September 15. When the steam road changes from its summer to its winter schedule, the Peninsular railway will take over the line operated by the Southern Pacific between Los Gatos and Palo Alto and operate it electrically.

TELEPHONE AND TELEGRAPH.

VANCOUVER, B. C.—The British Columbia Telephone Company of Vancouver have completed plans for the erection of a new telephone exchange in Coquitlam.

CLOUDCROFT, N. M.—It is expected that the telephone line to connect Cloudcroft with Mayhill will be completed in a short time. The line will have connections with Bell phones in Cloudcroft and long distance.

NOGALES, ARIZ.—P. C. Gittins, district manager of the Mountain States Telephone & Telegraph Company, states that long promised installation of a new telephone plant in this city will be begun in a short time.

NEVADA CITY, CAL.—The Pacific Telephone & Telegraph Company has started to rebuild the telephone line from Camptonville to Sattley, a distance of 42 miles. The new line will run from Camptonville to Alleghany and Forest City, Downieville, Goodyears Bar, Sierra City and Sattley, with other stations en route.

SAN FRANCISCO, CAL.—Chairman Alex. Vogelsang the supervisors public utilities committee, suggested at a recent meeting that City Attorney Long be authorized to enter into negotiations with the Pacific Telephone & Telegraph Company along the lines heretofore proposed for reaching a compromise between the city and the corporation. Under this the city could cease attacking the merger of the Pacific and Home companies on condition that both systems be operated hereafter under the terms of the Home franchice relating to the payment to the city of a percentage on the gross receipts. Such an arrangement would mean $60,000 a year for the city, whereas, under the terms of the Pacific franchise, no percentage is paid. The matter was laid over for a week.

WATERWORKS.

PRIEST RIVER, IDAHO.—Bonds in the sum of $14,000 have been voted for the construction of a water system.

KOOSKIA, IDAHO.—At a special election held here bonds to the amount of $10,500 were authorized for the purposes of constructing a modern water system for the town.

VANCOUVER, B. C.—For a water supply for West Vancouver, Municipal Engineer Carter is applying to the City of Vancouver for one cubic foot a second, or at least ¾ of a cubic foot a second by tapping the Capilano system.

SAWTELLE, CAL.—Citizens of Sawtelle are making a protest against sale of franchise to lay water pipes in streets of Sawtelle stating that such sale will hamper and delay the establishment of municipal water works by which to carry Owens River water to consumers.

LOS ANGELES, CAL.—Annexation of Arlington Heights to Los Angeles is advocated, the Arlington Heights Boulevard Improvement Association being behind the plan. E. W. Grannis, secretary of the association, stated that the chief object of this move is to procure water from Franklin canyon, through aqueduct project.

SAN FRANCISCO, CAL.—The Judge Advocate of the Western Department of the U. S. Army has taken possession of Lobos Creek, the source of water supply for the Presidio and for Fort Mason, under section 1416 of the Revised Statutes, Civil Code, State of California, which gives a water user the privilege of appropriating a water supply pending the settlement of any controversy over ownership, and so has put up to the Spring Valley Water Company, the duty of showing what claim it has to the title to half of the creek. The decisive move was announced a the Judge Advocate's office to be necessary at this time to protect the interests of the United States, and, as a first step toward settling once and for all time the controversy as to whether or not the Federal Government can secure title to the creek without paying an exorbitant amount of money for the right to use the water flow exclusively.

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